Draft

Programmatic Environmental Assessment
for
Vehicle and Cargo Inspection System (VACIS)

Department of the Treasury
United States Customs Service
Applied Technology Division

- DRAFT -

PROGRAMMATIC ENVIRONMENTAL ASSESSMENT FOR VEHICLE AND CARGO INSPECTION SYSTEM (VACIS)

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EXECUTIVE SUMMARY

This Programmatic Environmental Assessment (PEA) evaluates the potential environmental consequences resulting from the fielding and operation of the Vehicle and Cargo Inspection System (VACIS) at various sea and land ports of entry throughout the United States (US) and Puerto Rico. It satisfies the requirements specified in the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality regulations implementing NEPA, and US Treasury Department regulations for NEPA compliance, which direct the US Customs Service (USCS) and other federal agencies to fully understand, and take into consideration during decision making, the environmental consequences of proposed federal actions.

VACIS provides a significant Non-Intrusive Inspection (NII) capability to aid the USCS in stemming the flow of contraband into the US. The USCS plans to deploy three VACIS configurations: 1) A semi-permanent version designed for inspection of motor vehicles and cargo containers at USCS ports of entry (VACIS II); 2) A truck-mounted version designed for high-portability inspection of motor vehicles and cargo containers (Mobile VACIS); and 3) A fixed version designed specifically for installation along railroad rights of way, for the inspection of railroad cars (Rail VACIS). Each VACIS configuration incorporates a low-level gamma radiation fixed gauge comprising a Cesium-137 (^{137}Cs) gamma radiation source in a shielded enclosure, and a sodium iodide detector array. The cargo is placed between the source and the detector array. One or two shutters (depending on the VACIS configuration) are opened on the shielded enclosure, allowing gamma radiation to scan the cargo. The detector array measures any gamma radiation that passes through the cargo. The amount of gamma radiation detected indicates the thickness and/or density of the cargo being scanned. This information is made available at the Customs inspector's computer display as a shaded image with the denser material appearing darker, and the less dense material appearing lighter. The Customs inspector, using his/her training and experience, visually evaluates the shaded image, using the density, location, and shape of the components of the image to identify possible contraband such as drugs, guns, or other illegally-imported items.

A summary of the conclusions reached in this PEA regarding the proposed action (acquisition of VACIS) is detailed below:

Geology and Soils – Implementing the proposed action will not impact geology. Potential impacts to soils from construction activities will be minimized through implementing best management practices for sedimentation and erosion control.

Hydrology and Water Quality – Construction related to the installation of VACIS has the potential to cause increased runoff and sedimentation during construction, and in the period between construction and vegetation re-establishment. Erosion and sedimentation control plans and a stormwater management plan will be prepared and implemented to limit impacts to water quality from implementing the proposed action. Because of the small scale associated with VACIS, increased surface runoff would be negligible. No impacts to hydrology are expected as a result of the proposed action.

Floodplain – Floodplains will not be directly impacted by the proposed action.

Wetlands – Wetlands will not be directly impacted by the proposed action.

Coastal Zone Management – The Coastal Zone will not be directly impacted by the proposed action.

Vegetation and Wildlife – No significant loss of habitat is anticipated by implementing the proposed action. Impacts to wildlife are anticipated to be minimal.

Threatened and Endangered Species – Implementing the proposed action is not anticipated to impact federal or state threatened or endangered species.

Air Quality – Implementing the proposed action is not anticipated to have a significant impact on air quality. Construction-related activities would result in a temporary increase in air emissions. Minor impacts to air quality are considered as the combination of temporary construction related emissions, negligible transportation-related (vehicle idling) emissions, and any minor system operation-related emissions.

Noise – Minor modifications and improvements to existing structures, and construction of new facilities would create temporary noise impacts. Noise created from the installation and operation of VACIS would be within limits established by the Occupational Safety and Health Administration.

Land Use – None of the fielding sites associated with the proposed action are located in prime farmland. Implementing the proposed action is consistent with current and proposed land uses.

Infrastructure/Utilities – Implementing the proposed action at any of the sites will not have a significant impact on infrastructure or affect communities' requirements for public utilities.

Traffic/Transportation – Implementing the proposed action will have a negligible impact on traffic.

Hazardous Wastes/Materials – The proposed action represents a small increase in the amount of hazardous substances currently generated. Any hazardous materials generated will be collected and disposed of in accordance with federal and state regulations.

Historic and Archaeological (Cultural) Resources – Implementing the proposed action is not anticipated to have an impact on cultural or historic resources.

Radiological Consequences – As promulgated by the Nuclear Regulatory Commission in 10 Code of Federal Regulations (CFR) Part 20, the maximum permissible level of radiation dose to the general public in unrestricted areas is 0.1 rem (100 mrem; 100,000 μrem) per year. The USCS has chosen this same radiation dose level as the maximum permissible level for Customs inspectors. Based upon a criterion of 2000 hours per year as the typical time of exposure, neither Customs inspectors nor the general public will experience a dose greater than 0.00005 rem (0.05 mrem; 50 μrem) per hour above natural and man-made background radiation. The radiation dose from VACIS will be limited to no more than 0.00005 rem (0.05 mrem; 50 μrem) per hour through the establishment of radiation safety exclusion zones.

Conclusion – After considering all of the aforementioned factors and issues, this Programmatic Environmental Assessment concludes that VACIS will not adversely affect the physical, cultural, and socioeconomic environments, and hereby provides a Finding Of No Significant Impact (FONSI) relative to fielding of the overall VACIS program by the USCS. Site-specific analyses will be performed for each location in the US or its territories, where the USCS installs VACIS II, Mobile VACIS, and/or Rail VACIS. Each site-specific analysis will be reported in a Supplemental Environmental Assessment, which will tier off of this PEA in accordance with 40 CFR Part 1508.28.

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Section 1
INTRODUCTION

1.1 BACKGROUND

Contraband smuggling is a serious and continuing problem in the United States (US). For example, in Fiscal Year 2000 alone, a total of 1,288,650 pounds of marijuana, 149,844 pounds of cocaine, and 2,552 pounds of heroin were seized nationally by the US Customs Service (USCS).[1] As the Nation's principal border agency, the mission of the USCS is to ensure that all goods and persons entering and exiting the US do so in compliance with all US laws and regulations. This mission is accomplished primarily through physical inspection of cargo, conveyances, and persons as they enter the country. To improve the inspection process, the USCS continuously seeks technological solutions that are cost effective, and that are safe for both humans and the environment.

A promising new method of conducting inspections involves the use of Non-Intrusive Inspection (NII) techniques, which employ technologies such as low-power X-ray or low-power gamma radiation sources to "see" into cargo containers and identify potential contraband. NII technologies allow Customs inspectors to inspect for contraband without having to physically enter into or unload motor vehicles or containers. The effective and efficient screening and processing of low risk cargo, conveyances, and persons will allow the USCS to focus the bulk of its anti-smuggling and trade enforcement resources on suspected and actual law violators, thereby increasing both the potential and the reality of detection. Strategically placing these systems at ports of entry will provide an effective barrier along the borders, and will force smugglers to take higher risks to bring contraband into the US, increasing the chance of interception.

Acquisition of key systems and supporting technologies identified in the *Ten-Year Counterdrug Technology Plan and Development Roadmap* will lead, within the next five years, to a "family" of NII systems that would satisfy the goals of the *National Drug Control Strategy* for achieving the levels of inspection necessary to deter drug traffickers from using ports of entry. These systems and technologies are summarized in Figure 1.

As part of this multi-technology approach to combating the smuggling of illicit drugs into the US, the Vehicle and Cargo Inspection System (VACIS) fulfills the current NII technology requirement for gamma imaging technology identified in the *Ten-Year Counterdrug Technology Plan and Development Roadmap*.

The USCS plan to shield the US borders against drugs and other contraband, by decreasing the probability of smuggling through ports of entry, is enhanced by the introduction of VACIS. This project provides a vital element in the USCS counterdrug and enforcement responsibilities. VACIS increases enforcement effectiveness and efficiency, and its development and acquisition is a rapid response to a new threat. VACIS augments the capabilities of the Customs inspector by acting as a force multiplier that enables inspectors to increase the quality, quantity, and scope of their activities. With a projected 160 high confidence inspections per day, VACIS is expected to increase the number of high confidence inspections per day by approximately 615% without an increase in inspection manpower. This is expected to result in an average cost benefit of approximately $13,400 per day, per site, compared to the current average of 26 high confidence inspections per day.[2] Additionally, because it allows more efficient inspections to be performed, VACIS is expected to increase the flow of commerce, resulting in a positive benefit to the business community.

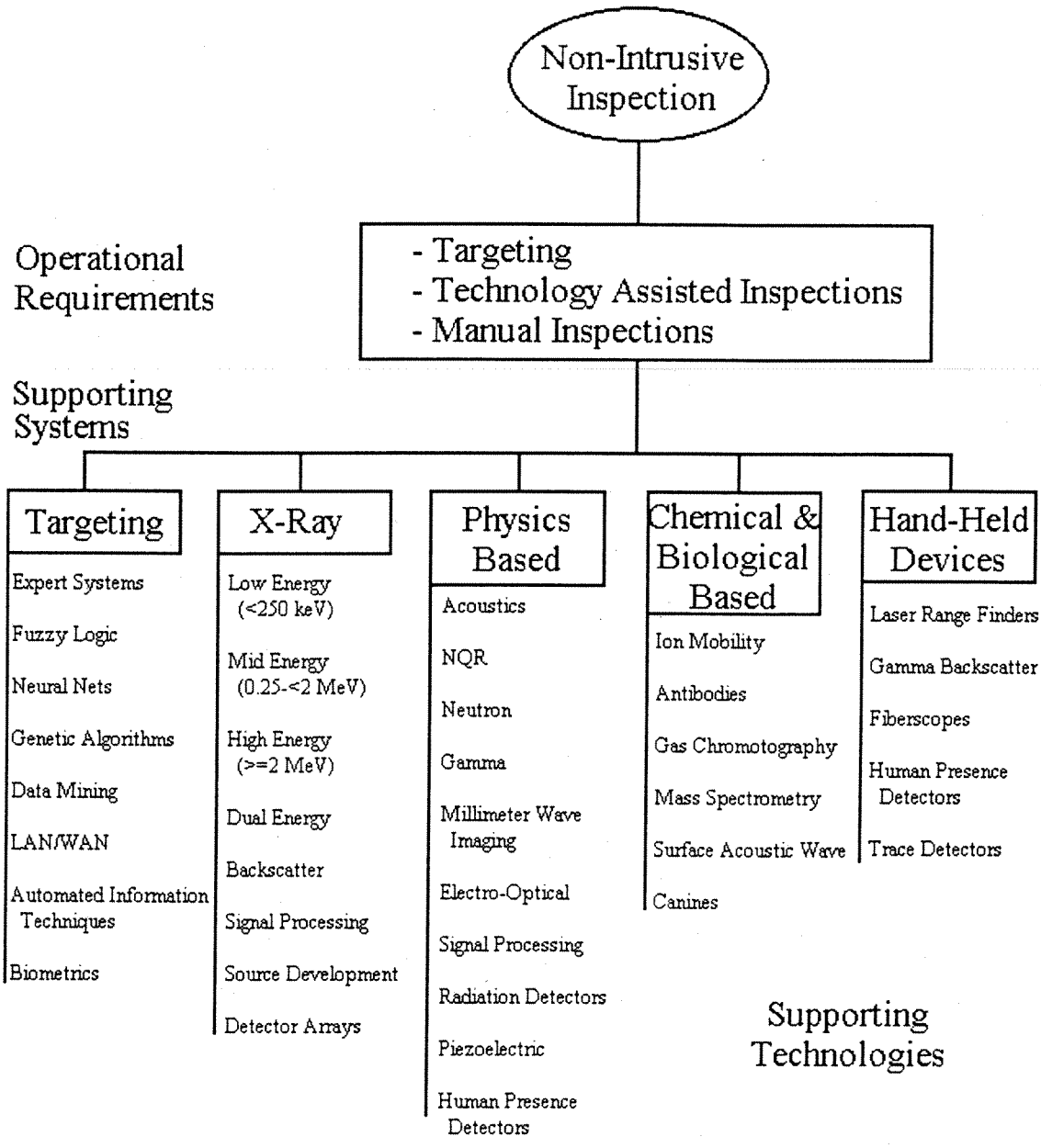


Figure 1. Key systems and supporting technologies that offer the potential for significant improvement of operational capabilities in detecting illicit substances transported into the US. (Source: *Ten-Year Counterdrug Technology Plan and Development Roadmap*, Office of National Drug Control Policy, June 1998)

1.2 WHY A PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

The National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500 through 1508), and US Treasury Department regulations for NEPA compliance (Treasury Directive 75-02) direct the USCS and other federal agencies to fully understand and take into consideration, during decision making, the environmental consequences of proposed federal actions (projects). Therefore, the USCS must comply with NEPA before making federal funds available for the acquisition of VACIS.

The USCS has determined that the majority of the typical recurring actions proposed for funding, and for which an Environmental Assessment (EA) is required, can be grouped by type of action or location. These groups of actions can be evaluated in a Programmatic Environmental Assessment (PEA) to comply with NEPA and its implementing regulations, without having to produce a time-consuming stand-alone EA for every action.

This PEA discusses the potential environmental impacts as a result of implementing various project alternatives for VACIS. This PEA also provides the public and decision-makers with the information required to understand and evaluate these potential environmental consequences. Project or site-specific information will be required to fully evaluate potential impacts; therefore, a site-specific Supplemental Environmental Assessment (SEA) will be prepared for each project, as described in Section 1.3 herein.

1.3 PROGRAMMATIC PROCESS

This PEA covers typical actions that are eligible for USCS funding for the acquisition, fielding, and operation of gamma-ray non-intrusive imaging equipment for use at sea, air, and land ports of entry. Because actions proposed for funding under this PEA and impacts of these actions can vary based on location and other site-specific criteria, an SEA and corresponding Finding Of No Significant Impact (FONSI) will be issued for each individual project covered by this PEA, assuming impacts can be kept below significant levels. The resulting SEA will tier off of this PEA, in accordance with 40 CFR Part 1508.28. Projects for which it has been determined, during the preparation of the SEA, that a more detailed environmental review is required, or projects that do not fit into the typology included in this PEA, will be subject to the standard EA or Environmental Impact Statement (EIS) process as required by NEPA.

Cumulative impacts are defined as the impact on the environment that results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts are not addressed in this PEA because analysis of these impacts requires specific knowledge of other projects occurring within or near the study area. Based on the scope of this PEA, such information cannot be determined because the study area is nationwide. Cumulative impacts will be addressed in each site-specific SEA.

Section 2
SYSTEM DESCRIPTION

The USCS plans to deploy three VACIS configurations: 1) A semi-permanent version designed for inspection of motor vehicles and cargo containers (VACIS II); 2) A truck-mounted version designed for high-portability inspection of motor vehicles and cargo containers (Mobile VACIS); and 3) A fixed version designed specifically for installation along railroad rights of way for the inspection of railroad cars (Rail VACIS). Each VACIS configuration incorporates a low-level gamma radiation fixed gauge comprising a gamma radiation source in a shielded enclosure, and a detector array mounted between 15 feet and 30 feet from the source. The cargo to be scanned is placed between the source and the detector array. The gamma radiation source will be housed in a self-contained, fireproof tungsten housing with a motor-driven lead aperture (shutter). Depending on the VACIS configuration, either one shutter or two shutters (primary shutter and secondary shutter) are opened, allowing gamma radiation to scan the cargo. The detector array on the opposite side of the cargo measures any gamma radiation that passes through the cargo. The amount of gamma radiation detected indicates the thickness and/or density of the cargo being scanned. This information is made available at the operator's (i.e., Customs inspector's) computer display as a shaded image with the denser material appearing darker and the less dense material appearing lighter. The Customs inspector, using his/her training and experience, visually evaluates the shaded image using the density, location, and shape of the components of the image to identify possible contraband such as drugs, guns, or other illegally-imported items.

The gamma radiation source used in all VACIS configurations is Cesium-137 (^{137}Cs) with a radioactivity of between 1.0 and 2.0 curies, depending on the VACIS configuration. Each VACIS configuration uses a different amount of ^{137}Cs, based mainly on the required cargo scan rate. For example, increasing the curie level of the radiation source allows for a higher cargo scan rate. Additionally, increasing the curie level of the radiation source allows for a slightly greater degree of penetration of the cargo. A tradeoff associated with increasing the curie level of radiation is that the cargo experiences an increased radiation dosage. In all VACIS configurations, the ^{137}Cs source is expected to have an operational life of 10 to 12 years.

Based on the aforementioned radiation source characteristics, VACIS II will employ 1.0 curie of ^{137}Cs (the smallest amount of the three VACIS variants) because it will be used primarily for controlled, low-speed scanning of truck bodies and intermodal containers that are composed of relatively thin metal. Rail VACIS, on the other hand, will be used to scan moving freight train rail cars with a speed ranging from 0.5 to 5 miles per hour and whose construction may employ thick metal. Hence, Rail VACIS will employ a 2.0 curie ^{137}Cs radiation source. Mobile VACIS has an essentially "in the middle" radiation source requirement in that it will be used to scan cargo (primarily trucks, intermodal containers, and some rail cars) at a rate not quite as controlled and as slow as VACIS II, but not as variable and as fast as Rail VACIS. Because of this, Mobile VACIS will employ 1.6 curies of ^{137}Cs.

Radiation safety exclusion zones have been established for VACIS II, Mobile VACIS, and Rail VACIS in order to limit the radiation dose to no more than 0.00005 rem (0.05 mrem; 50 μrem) per hour above the 0.00018 rem (0.18 mrem; 180 μrem) per hour dose provided by natural background and man-made radiation. The radiation safety exclusion zones for the three VACIS configurations were established from field measurements conducted by a Certified Health Physicist.[3] Unauthorized persons will not be allowed in the radiation safety exclusion zones during VACIS operations.

It should be noted that although it is a new application for the USCS, the radioactive fixed gauge has been used successfully and safely in industry for many years, including measuring the thickness of paper

produced in paper mills and ensuring that bottles are filled to the proper level in mass-production facilities such as beer breweries. Fixed gauges specifically incorporating ^{137}Cs are used in the medical and industrial fields for applications including treating cancerous tumors, measuring and controlling liquid flow in pipelines, and as a density gauge in determining whether oil wells are plugged by sand.

Detailed descriptions of the three VACIS configurations are provided in the following subsections.

2.1 VACIS II

2.1.1 Functional Characteristics

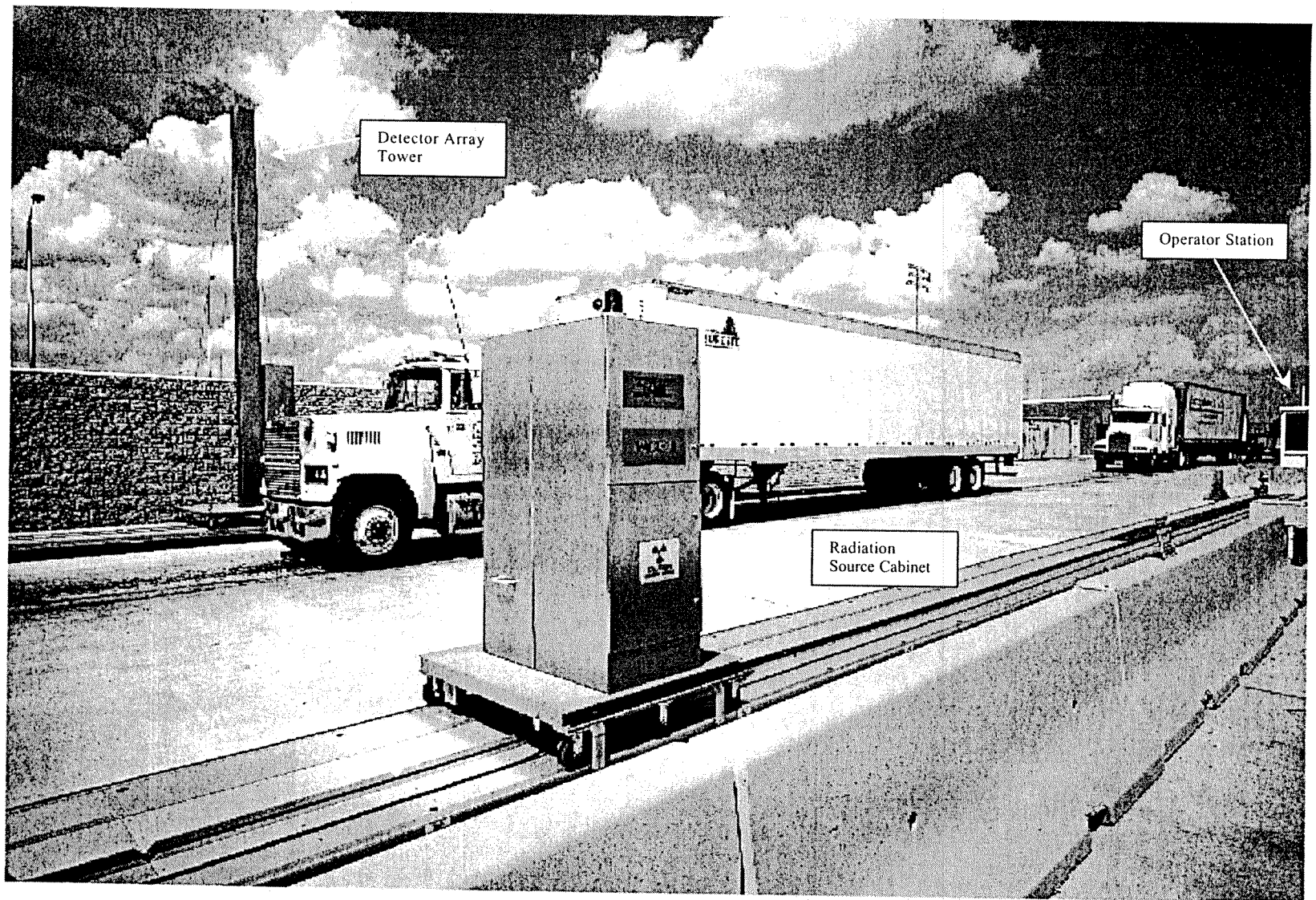
A representative photograph of a VACIS II installation is shown in Figure 2. A close-up photograph of a typical fixed VACIS II operator station is shown in Figure 3. A photograph of a typical VACIS II mobile operator station (e.g., recreational vehicle) is shown in Figure 4. VACIS II consists of two 90-foot long tracks that are placed, in parallel, 30 feet apart. On one track is the gamma radiation source (1.0 curie of ^{137}Cs) and on the opposite track is a 21-foot tall tower containing the sodium iodide detector array sensors. During operation, the motor vehicle to be inspected parks between the two tracks, and the driver exits the vehicle and is escorted to a safe waiting area. The radiation source and the detector array tower begin moving, in synchronized fashion, down the tracks as the scan sequence is begun. The gamma rays are emitted from the source, pass through the vehicle, and are detected by the tower-mounted sensor array. The scan image is processed in the VACIS II operator station and displayed on a monitor for operator identification of cargo density anomalies that may indicate suspected contraband. Images of suspected contraband may be stored on the system computer for potential use as evidence in smuggling prosecution cases. The VACIS II equipment runs on externally-supplied household electrical power, requiring two 120 VAC, 20 A, 60 Hz circuits.

VACIS II incorporates two ^{137}Cs source shutters, designated primary and secondary. During operation, the primary shutter is opened and remains open, while the secondary shutter is opened to commence a scan and closed to end the scan. VACIS II has an average scanning time of 1 foot per second and an average inspection time of 2 to 3 minutes per vehicle. It is capable of scanning objects up to 8.5 feet wide by 70 feet long, with a maximum height of 14 feet. The exposed parts of VACIS II are constructed of stainless steel, providing resistance to rain, high humidity, and moderate wind. The system can operate in temperatures ranging from 0 to 120 degF.

At those sites where the weather is often particularly harsh, the entire VACIS II installation may be located in an existing or newly-constructed building. A typical building suitable for use in this application is shown in Figure 5.

In order to accommodate the radiation safety exclusion zone discussed in Section 6.14.2.3.1 herein, each VACIS II installation will require a rectangular footprint area measuring 110 feet x 65 feet, exclusive of the operator station or any associated buildings.[4]

VACIS II is equipped with several safety features to prevent injury. These consist of flashing lights and an audible alarm indicating when radiation is being emitted; microswitches and shock absorbers at the end of the track to prevent trolley over-travel; and emergency shut-off buttons located in six different locations. The secondary shutter closes automatically when the source or detector array tower reaches the end of their pre-selected scan distance. The shutter also closes in the event that the source or detector array tower reaches the end of the track. The system operator may also manually close the shutter. Both the primary and secondary shutters are of fail-safe designs, whereby each shutter will automatically close upon loss of electric power to the VACIS equipment. The primary shutter is designed so that a padlock may be used to secure the source in the OFF position.



Photograph Courtesy of SAIC

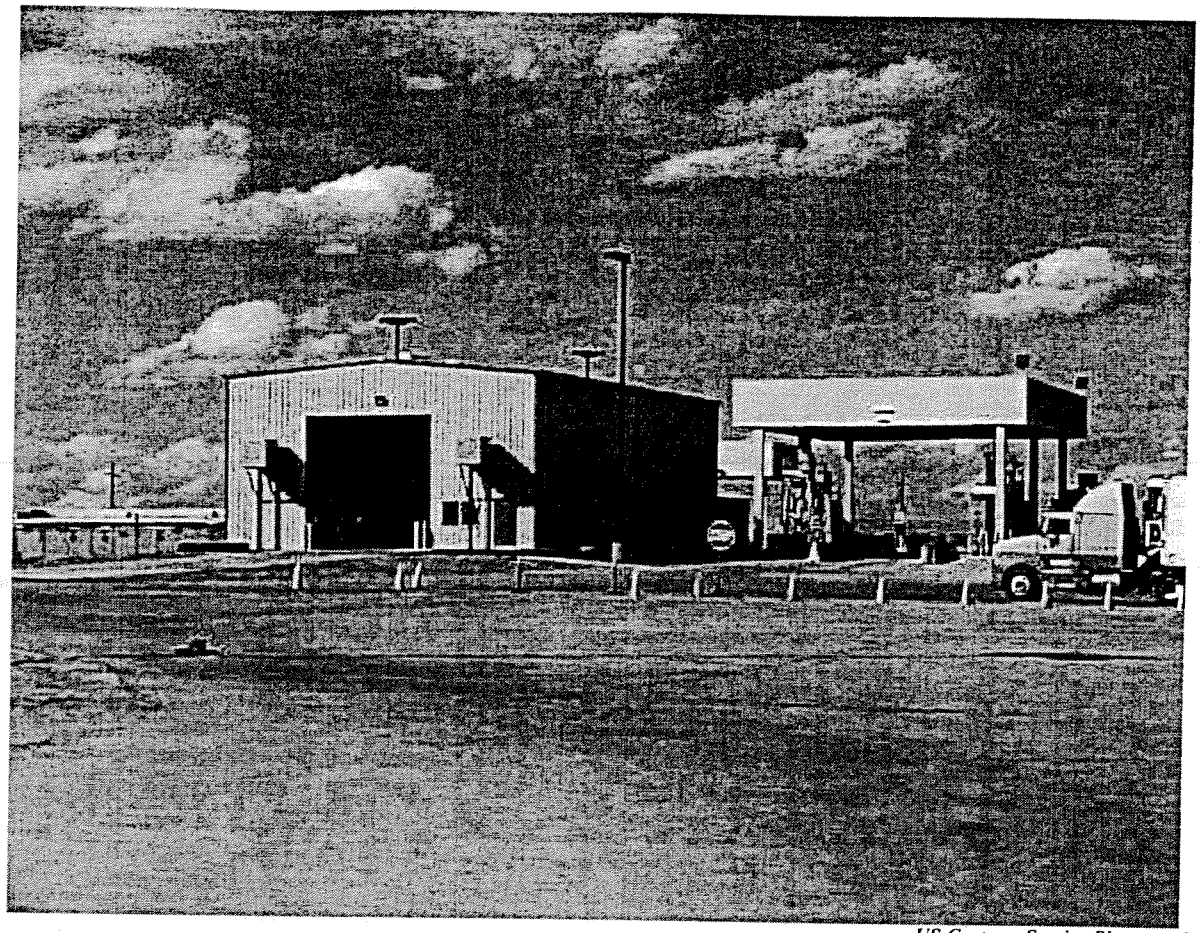
Figure 2. VACIS II scanning a tractor-trailer.

US Customs Service Photograph

Figure 3. Typical VACIS II fixed operator station.

US Customs Service Photograph

Figure 4. Typical VACIS II mobile operator station.



US Customs Service Photograph

Figure 5. On the left, typical building suitable for housing VACIS II installation.

2.1.2 Operational Procedures

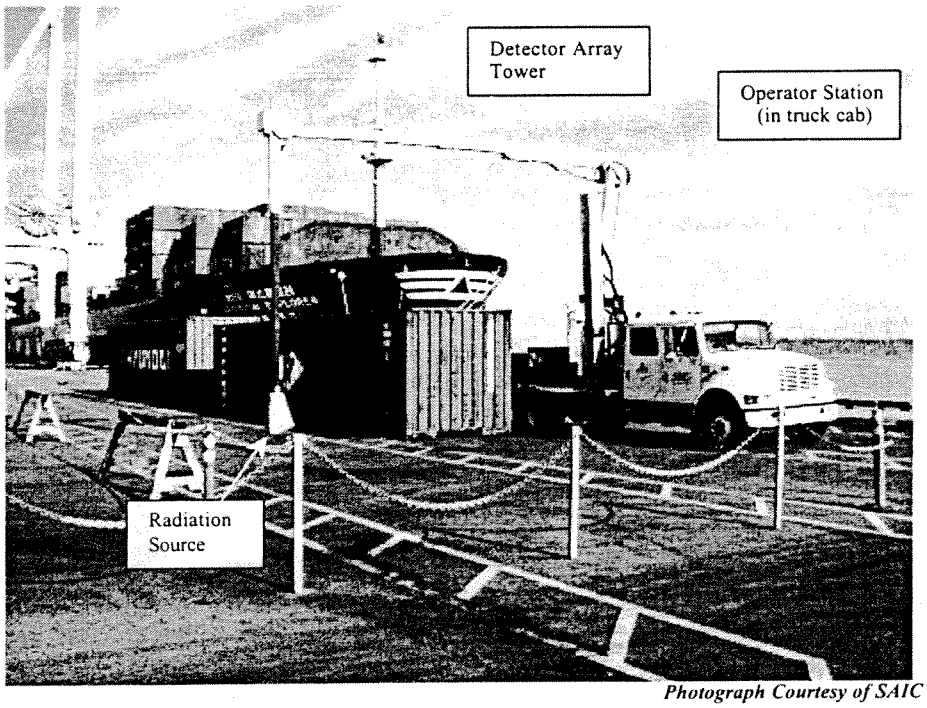
The basic VACIS II operating steps are: 1) At the start of a shift, the primary shutter is unlocked and the computer system is turned on. A key is needed to operate the primary shutter from the shutter control box. 2) The system operator tests the primary and secondary shutters and indicating lights. 3) The primary shutter is opened and kept opened throughout a shift. 4) Traffic control personnel direct the driver of the motor vehicle to be scanned to drive into the area between the VACIS II source and detector array tower tracks, and park the vehicle. 5) The system operator escorts the driver/passengers of the vehicle to be scanned to a point outside of the radiation safety exclusion zone area and asks the driver whether there are any remaining persons or animals in the vehicle. If so, the vehicle is not scanned, but is identified for further detailed manual inspection. 6) The system operator verifies that there are no persons within the radiation safety exclusion zone area. 7) The system operator starts the scan from the computer. This opens the secondary shutter on the radiation source, and initiates the synchronous movement of the source and detector array tower along the length of the vehicle. 8) A density map is stored. The system operator inspects the density map to identify any contraband or potential contraband storage locations. 9) After the audible alarm has stopped sounding and the red indicator lights have stopped flashing, indicating that the secondary shutter is closed, the driver is escorted back to the vehicle. The driver is then directed to drive the scanned vehicle out of the radiation safety exclusion zone area. 10) Steps 4

through 9 are repeated for each vehicle undergoing a scan. 11) At the end of a shift, both shutters are closed and the computer system is turned off. The key is removed from the shutter control box, and the primary shutter is padlocked.

2.2 MOBILE VACIS

2.2.1 Functional Characteristics

A representative photograph of Mobile VACIS is shown in Figure 6. Mobile VACIS is similar to VACIS II, except that it is installed on a flatbed straight truck. The gamma radiation source (1.6 curies of ^{137}Cs) is located on a boom extending away from the truck, and the sodium iodide detector array sensors are located on a tower mounted on the truck. Mobile VACIS incorporates one ^{137}Cs source shutter. The entire system runs on internally-supplied household electrical power, requiring two 120 VAC, 20 A, 60 Hz circuits which are supplied by an onboard generator and rechargeable truck batteries. The operator station is located within the radiation-shielded cab of the Mobile VACIS truck.[5]



Photograph Courtesy of SAIC

Figure 6. Mobile VACIS scanning a cargo container.

During operation, Mobile VACIS requires an equipment installation area 30 feet wide with a length corresponding to the scanned object length, and a height of 17 feet. For storage purposes, a 26 feet long by 8 feet wide area is required, with a 10 feet 4 inch ceiling clearance. In order to accommodate the radiation safety exclusion zone discussed in Section 6.14.2.3.2 herein, each Mobile VACIS installation will require a square footprint area measuring 50 feet x 50 feet, exclusive of any associated buildings.[6]

Mobile VACIS is capable of scanning single rows of cargo containers as well as tractor-trailers at a rate of 88 inches per second (5 miles per hour). The system is equipped with lights to allow it to operate at

night and can operate in all types of weather. It is capable of operating in temperatures ranging from 0 degF to 120 degF and in up to 40 mph winds.

Mobile VACIS can scan motor vehicles and cargo containers using two operational modes:

- Fixed Scanning Mode - During the fixed scanning mode of operation, the Mobile VACIS unit parks in one place as motor vehicles to be scanned pull up under the boom between the radiation source and detector array sensors, and stop with the passenger cab just past the gamma radiation source. The VACIS scanning equipment is then turned on, and the driver of the vehicle to be scanned slowly moves forward until the vehicle is through the scan. The scanning equipment is then turned off.

- Mobile Scanning Mode – When in the mobile scanning mode of operation, the Mobile VACIS truck is positioned so that the motor vehicle or cargo to be scanned is lined up under the boom between the radiation source and detector array sensors. The Mobile VACIS truck is then driven past the vehicle or cargo container to be scanned, while the VACIS scanning equipment is operating. When the Mobile VACIS unit reaches the end of the vehicle or cargo container being scanned, the scanning equipment is turned off.

In both Mobile VACIS operational modes, the digital images are sent to a monitor located inside the truck cab where the operator is located. The VACIS operator views the images to identify anomalies that should be investigated further. The system computer can store these images for potential use as evidence in smuggling prosecution cases.

At those sites where the weather is often particularly harsh, the entire Mobile VACIS installation may be located in an existing or newly-constructed building. In these cases, existing warehouse buildings may be used, or the construction of buildings on a concrete foundation may be preferred. A typical building suitable for use in this application is shown in Figure 5.

Mobile VACIS is equipped with several safety features to prevent injury. These consist of flashing lights and an audible alarm indicating when radiation is being emitted, and emergency shut-off buttons. The shutter closes automatically at the end of a pre-selected scan time. The system operator may also manually close the shutter. The shutter is of a fail-safe design, whereby the shutter will automatically close upon loss of electric power to the VACIS equipment. The shutter is designed so that a padlock may be used to secure the source in the OFF position.

2.2.2 Operational Procedures

Mobile VACIS requires at least two fully trained operators. One operator sits in the cab of the Mobile VACIS truck and operates the scanning equipment. The second operator drives the Mobile VACIS truck when in mobile scanning mode, helps with positioning the vehicle or cargo container to be scanned, and helps ensure radiation safety (e.g., keeping persons outside of the radiation safety exclusion zone).

The operating steps provided below are applicable when Mobile VACIS is in fixed scanning mode and motor vehicles are pulling up to be scanned. Comparable steps are followed, as appropriate, during mobile scanning mode operations.

The basic operating steps are: 1) A radiation safety exclusion zone is set up around the Mobile VACIS truck. The radiation safety exclusion zone is demarcated with rope and signage. 2) Pilasters, lane markers, and associated signage are set up and positioned. 3) The Mobile VACIS computer system is turned on and the key is used to energize the control box. A password is required to access system

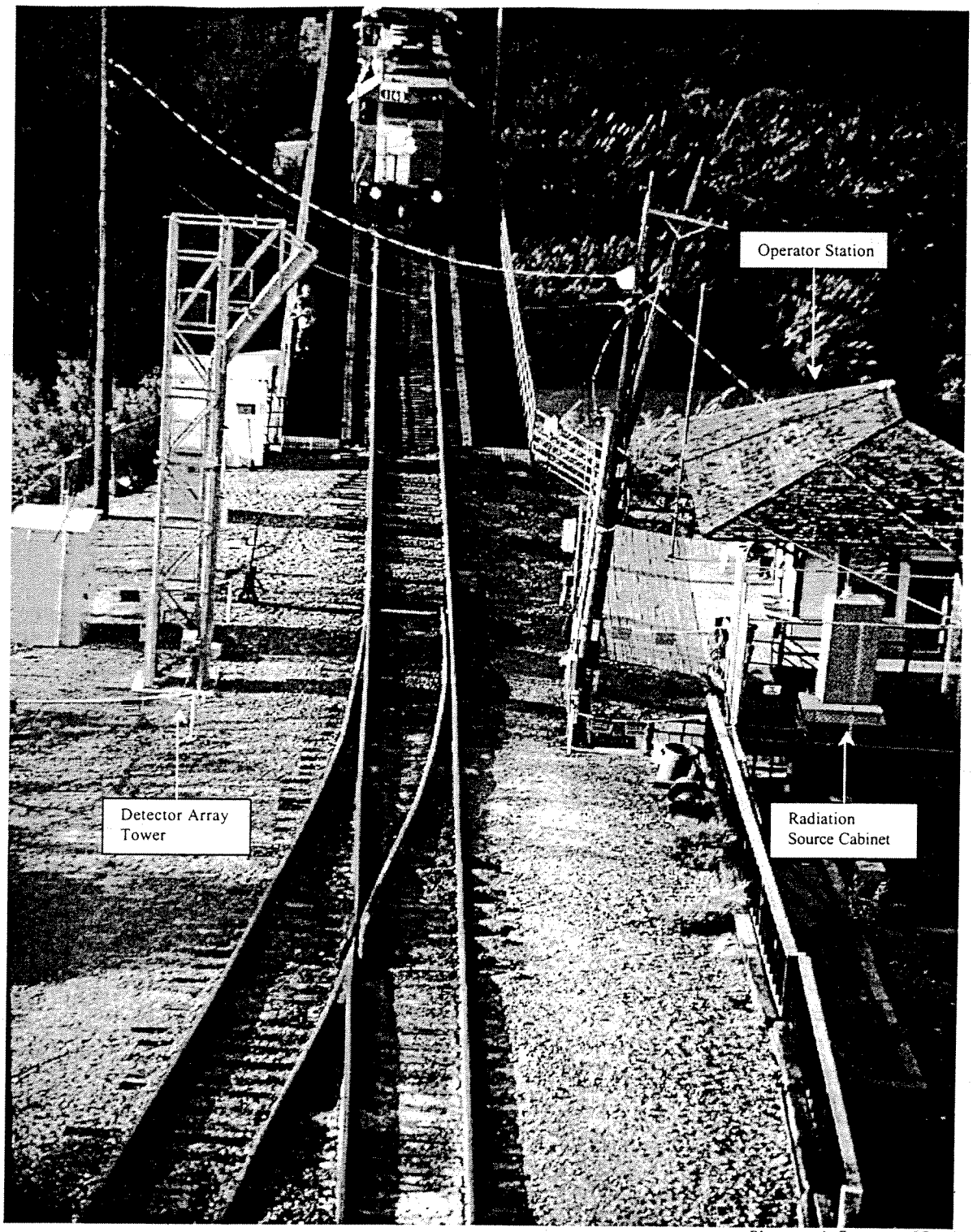
software to open the shutter. 4) The Mobile VACIS truck's diesel engine is started. 5) The shielded storage box that houses the radiation source is unlocked, the radiation source is unlocked, and the locking pin is removed from the radiation source. 6) The radiation source and detector array tower are positioned using the Mobile VACIS truck's hydraulic lifts. 7) The radiation source shutter is opened, and the area is surveyed to verify that exposure rates outside the radiation safety exclusion zone are less than 0.00005 rem (0.05 mrem; 50 μrem) per hour. The exposure rate shall be measured by a qualified operator using a calibrated survey meter. 8) An operational checklist is completed to ensure that the safety lights and audible beacon are functioning appropriately and that all required signage is in place. 9) Traffic control personnel direct the driver of the motor vehicle to be scanned to drive forward and position the vehicle under the boom between the radiation source and detector array tower. 10) A system operator asks the driver of the vehicle to be scanned whether there are any remaining persons or animals in the vehicle. If so, the vehicle is not scanned, but is identified for further detailed manual inspection 11) The system operators verify that there are no persons in the radiation safety exclusion zone. 12) The scanning equipment operator opens the radiation source shutter either manually, or automatically through system software, and a system operator asks the driver of the vehicle being scanned to pull forward. 13) A density map of the scanned vehicle is acquired and stored. 14) The radiation source shutter is closed either manually, automatically through system software, or by the safety-related timeout. 15) The scanning equipment operator inspects the density image to identify any anomalies that may indicate the presence of contraband. 16) Steps 9 through 15 are repeated for each vehicle undergoing a scan. 17) At the end of operations, the radiation source shutter is closed and the key is removed from the control box. The system computer is turned off. The detector array tower and radiation source are returned to their storage locations. The radiation source is secured within the shielded storage box. The radiation source shutter is secured with the locking pin and padlock. The shielded storage box is locked.

2.3 RAIL VACIS

2.3.1 Functional Characteristics

A representative photograph of Rail VACIS is shown in Figure 7. The gamma radiation source (2.0 curies of ^{137}Cs) is located in a cabinet on one side of the railroad track, and the sodium iodide detector sensor array is located on a 32 foot tall tower on the other side of the track opposite from the radiation source. The installation incorporates track speed sensing devices well in advance of the Rail VACIS equipment, that are used in determining the speed of the freight train to ensure that the proper speed for railcar scanning is maintained. As the train approaches, a light beam at the Rail VACIS installation is activated on one side of the railroad track which is directed across the track, and a detector on the opposite side of the track detects the light beam. As each rail vehicle breaks the beam, the Rail VACIS equipment uses this information to identify the discrete railcars being scanned. To aid the Rail VACIS operator in identifying which railcar is being scanned, a radio frequency reader is used to read the standardized identification markings located on the sides of the railcars. The system includes a video camera to record each car being scanned, as well as a closed-circuit TV camera for safety and surveillance. The operator station, which houses the control system and operator positions, can be located in a fixed building, portable building, or mobile vehicle, depending on local site requirements. The Rail VACIS equipment runs on externally-supplied household electrical power, requiring two 120 VAC, 20 A, 60 Hz power circuits.

The area required for the Rail VACIS equipment will vary depending on the installation site. In order to accommodate the radiation safety exclusion zone discussed in Section 6.14.2.3.3 herein, each VACIS installation will require a rectangular footprint area measuring 20 feet x 50 feet, exclusive of the operator station and any associated buildings.[7]



Photograph Courtesy of SAIC

Figure 7. Typical Rail VACIS installation.

2.3.2 Operational Procedures

The basic Rail VACIS operating steps are: 1) At the start of a shift, the radiation source shutter is unlocked and the VACIS computer is turned on. 2) Using radio communication, the Rail VACIS operator is alerted of an approaching freight train. 3) As the train approaches the Rail VACIS installation, the speed sensors detect the speed of the freight train, and the train crew is directed to adjust the train speed, as necessary, to ensure proper scanning of the railcars. 4) The rail vehicle detection light is illuminated perpendicular to the railroad track. 5) Once the locomotives are past the radiation source, the radiation source shutter is opened, commencing the scan of the railcars. 6) As each railcar breaks the light beam, the Rail VACIS equipment uses this information to identify the discrete railcars being scanned. 7) Using the radio frequency identification system, the Rail VACIS equipment uses the standardized railcar identification markings to aid the system operator to identify which railcar is being scanned. 8) As each railcar is scanned, the Rail VACIS equipment acquires, displays, and stores images of the scanned railcars. The system operator inspects the density image of each railcar to identify any anomalies that may indicate the presence of contraband. 9) Step 8 is repeated for each scanned railcar. 10) After the last railcar has passed, the radiation source shutter is closed. 11) The system operator informs the freight train crew regarding whether any railcars in the train just scanned require detailed manual inspection. 12) At the end of the shift, the VACIS computer is turned off, and the radiation source shutter is locked.

Section 3
PURPOSE AND NEED FOR THE ACTION

3.1 PURPOSE

The primary purpose of the proposed action is the acquisition of gamma-ray non-intrusive imaging equipment for use at sea and land ports of entry, to meet the need for gamma-ray non-intrusive inspection (NII) systems identified in the *National Drug Control Strategy*, and the *Ten-Year Technology Development Plan and Development Roadmap*.[8] VACIS will enable the Customs inspector to perform the effective and efficient NII of tankers and cargo vehicles, including trailer trucks and trailer-mounted cargo containers, for contraband such as illicit drugs, currency, and guns. As a part of a multi-technology approach to combating the smuggling of illicit drugs into the US, the VACIS program directly supports the USCS *Narcotics Strategic Plan*[9] to develop and introduce technologies to identify narcotics and support the goals of the *National Drug Control Strategy*[10] to shield America's air, land, and sea frontiers from the drug threat. The projected VACIS locations are shown in Table I.

3.2 NEED

Created in 1789, the USCS is one of the federal government's oldest agencies. Although its original mission was to collect revenue, the USCS mission has expanded to include ensuring that all goods and persons entering and exiting the US do so in accordance with all US laws and regulations. Moreover, a major goal of the USCS is to prevent the smuggling of drugs into the country by creating an effective drug interdiction, intelligence, and investigation capability that disrupts and dismantles smuggling organizations.[11]

The USCS' need for detection technology emanates from its responsibilities to control 301 ports of entry. Drugs can enter the US at or between the 301 ports of entry by air, land, and sea. They can be transported by or in people, cargo, and conveyances including cars, trucks, aircraft, and vessels. Customs inspectors are, therefore, required to perform inspections of cargo and conveyances as a prerequisite for entry into the US. The USCS annual workload at border ports, which is currently approximately 437 million people, 10 million containers and trucks, 117 million private vehicles, 1 million aircraft and marine vessels, and the collection of $20B in tariffs, will continue to increase, but USCS total resources are likely to remain relatively static.[12]

The need and the opportunity for the USCS to increase its investment in technology is, therefore, apparent. The effective and efficient screening and processing of low risk cargo, conveyances, and persons will allow the USCS to focus the bulk of its anti-smuggling and trade enforcement resources on suspected and actual law violators, thereby increasing both the potential and the reality of detection. Customs inspectors need the ability to conduct high-confidence inspections in a non-intrusive manner quickly and efficiently. NII technology provides the USCS with the capability of increasing the total number of inspections performed daily, and allows for the examination of very difficult commodities (e.g., tankers and hazardous materials) in a timely and cost effective manner.

The major focus of USCS' current plans for NII technology development and acquisition are based on the USCS *Narcotics Strategic Plan* and its interdiction objective:

- The goal of the USCS narcotics strategy is to prevent the smuggling of narcotics into the US by creating an effective narcotics interdiction, intelligence, and investigation capability that disrupts and dismantles smuggling organizations.

Table I. Projected VACIS locations.

Location	VACIS II	Mobile VACIS	Rail VACIS
Douglas, AZ		1	
Nogales DiConcini, AZ			1
Nogales Mariposa, AZ	1		
San Luis, AZ	1		
Calexico East, CA	1		
Calexico West, CA			1
Los Angeles, CA	1	2	
Otay Mesa, CA	2		
San Ysidro, CA			1
Jacksonville, FL		1	
Miami, FL		1	
Port Everglades, FL	1		
Tampa, FL		1	
Savannah, GA	1		
New Orleans, LA		1	
Detroit, MI	1		
Elizabeth, NJ	1		
Santa Teresa, NM	1		
Champlain, NY	1		
Howland Hook, NY	1		
Lewiston, NY	1		
San Juan, PR	1	1	
Charleston, SC		1	
Brownsville B&M, TX			1
Brownsville Los Tomates, TX	2		
Del Rio, TX	1		
Eagle Pass II, TX	1		1
El Paso BOTA, TX	1		
El Paso Del Norte-SF, TX			1
El Paso Del Norte-UP, TX			1
El Paso Ysleta, TX	1		
Hidalgo, TX	1		
Houston, TX	1		
Laredo Rail Bridge, TX	1		1
Laredo Bridge IV, TX	1		
Laredo Colombia, TX	1		
Los Indios, TX	1		
Pharr, TX	2		
Rio Grande City, TX	1		
Roma, TX		1	
Norfolk, VA		1	
TOTAL	**30**	**11**	**8**

(Source: USCS NII Technology Acquisition 5-Year Plan, 20 December 2000)

- The objective for narcotics interdiction is to develop and introduce technologies and techniques to identify smuggled narcotics, to force smuggling organizations to change to higher risk smuggling methods, and to enlist the participation of other nations in efforts to disrupt the worldwide smuggling of narcotics.

The USCS strategy for NII technology development and acquisition is influenced by the reality of its critical enforcement responsibilities with respect to drug smuggling. Drug smuggling is a real and immediate problem for the US; it is not a theoretical problem, nor one of the future. The USCS' choices regarding new technology also must recognize today's constraints on time and resources. If there is an available technology that responds to current and foreseeable requirements and priorities, and is both operationally and economically feasible, the USCS believes that they have an obligation to put that technology into use as soon as possible. The USCS cannot afford to wait for the elusive, perfect system that is always just over the horizon; rather, it must acquire effective devices for today's most critical areas as soon as the technology is available and affordable. The USCS also realizes that many operational requirements are not satisfied by available technology, and that development must be pursued strenuously to meet these needs. When these efforts produce equipment that meets its criteria, the USCS will add it to its arsenal; not because it is new or represents the state-of-the-art, but rather because it is necessary, effective, appropriate, and affordable.[13]

Section 4
THE PROPOSED ACTION AND ALTERNATIVES

4.1 ACQUISITION OF THE VACIS GAMMA IMAGING SYSTEM (Proposed Action)

The VACIS program is part of a multi-technology approach to combating the smuggling of contraband into the US. VACIS will enable the Customs inspector to perform the effective and efficient non-intrusive inspection of cargo vehicles including tanker and trailer trucks, trailer-mounted cargo containers, and railroad cars. Modular in design and capable of being rapidly deployed among different sites, VACIS will be capable of detecting contraband located in the vehicle body and chassis, tires, gas tanks, and hidden compartments. Complementing other new technologies under the USCS Five-Year Technology Acquisition Plan for the Southern Tier, the goals of the *National Drug Control Strategy and the USCS Narcotics Strategy* will be directly supported by the VACIS program.[14]

VACIS uses a medium energy gamma ray source (^{137}Cs) to generate images of trucks and cars similar to the images created by x-ray systems. Available low-energy x-ray technologies cannot penetrate full containers so their use is limited to screening for hidden compartments in empty containers and objects concealed near the surface of the structure of trucks and trailers. The x-ray systems do not effectively penetrate dense materials such as scrap iron, printed matter, and foodstuffs that are frozen or have a high moisture content. VACIS can probe deeper than an x-ray while emitting minimal radiation. Utilized as an enforcement tool, VACIS will help the USCS intercept narcotics shipments, while allowing the rapid processing of lawful international trade and travel.

Predominately a commercial off-the-shelf procurement, VACIS was originally developed by Science Applications International Corporation (SAIC) with funding from the USCS and the Office of National Drug Control Policy (ONDCP) to inspect empty tanker trucks. Department of Defense sponsored tests for VACIS were conducted at Thunder Mountain Evaluation Center (TMEC), Fort Huachuca, AZ.[15, 16]

The spending on contraband detection technologies that has occurred since 1990 has been due, in large part, to Congressional direction. Funds for the acquisition of NII technology and Automated Targeting Systems have been appropriated by Congress as part of the "Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1999 (P.L. 105-77, H.R. 4328, H. Rept. 105-825)".

Specifically, the two sections in this appropriation are:

- Omnibus Crime Bill Initiatives – (Non-Intrusive Inspection Technology and Automated Targeting Systems) for $54M

- Emergency Supplemental Appropriations – (Additional Non-Intrusive Inspection Technology to Augment the $54M) for $80M.

Gamma-ray Imagers (e.g., VACIS) are identified by specific line items, and account for $20.8M of the $134M appropriations as identified.[17]

4.2 ALTERNATIVES TO THE PROPOSED ACTION

The CEQ guidelines for the preparation of Environmental Assessments for major actions require an investigation and evaluation of alternatives to the proposed action as part of each assessment.

4.2.1 No Action Alternative

Inclusion of a "No Action" alternative in this PEA is required under NEPA. The No Action alternative maintains the status quo and evaluates the effects of not fielding VACIS or any other alternative action, thus providing a benchmark against which project alternatives may be evaluated. The No Action alternative is in conflict with the USCS mission of drug interdiction, the objectives of the *National Drug Control Strategy*, and the scope of the *Ten-Year Technology Development Plan and Development Roadmap* and, therefore, it is not a viable alternative.

4.2.2 Field a Gamma Imaging System other than VACIS

The ONDCP, Counterdrug Technology Assessment Center (CTAC) is responsible for coordinating federal counterdrug technology research and development. The *Ten-Year Technology Development Plan and Development Roadmap* has been prepared to satisfy the technology objectives within the five goals of the *National Drug Control Strategy*. The plan concentrates on the counterdrug technology needed by all federal agencies with drug control missions. Federal agencies such as the USCS are consulted within the technology research and development decision process, and will ultimately carry out implementation of the *Ten-Year Technology Development Plan and Development Roadmap*.

The acquisition and fielding of gamma ray imaging technology is a priority need in NII technology for which CTAC has solicited advanced concepts. The identification of VACIS to meet the gamma ray imaging technology need is a result of the technology assessment / research and development process outlined in the *Ten-Year Technology Development Plan and Development Roadmap*.[18] There are no other gamma imaging systems currently available. Therefore, fielding a gamma imaging system other than VACIS is not a viable alternative, and is not discussed further in this PEA.

On 19 March 1999, the Department of the Army, Fort Huachuca, AZ posted a Sources Sought notice in the Commerce Business Daily *CBDNet* identifying a requirement for the USCS to procure NII systems similar to VACIS II, and requesting responses from vendors able to provide commercial off-the-shelf systems.[19] The only vendor responding with a commercially available product was SAIC.[20]

Section 5
THE AFFECTED ENVIRONMENT

This section describes the existing conditions for each resource category, including applicable statutes. Some resources have more, or less, information than others concerning the existing conditions and regulatory background. The difference between resources depends on the nature of the resource, and is not an indicator of the resource's importance. For example, resources such as climate, geology, soils, hydrology, and flora and fauna species, are impossible to describe in a document that considers installation of systems in 14 states and Puerto Rico. A more detailed description of the affected environment in the area of the proposed action and alternatives will be provided in a Supplemental Environmental Assessment (SEA), as necessary, to evaluate project impacts.

5.1 CONSULTATIONS

As part of the process of determining whether a VACIS installation may significantly impact the resources located at or near the installation site, the USCS may be required to conduct consultations with federal, state, and local agencies. The USCS will typically provide the agencies with VACIS installation details such as location, excavation/construction requirements, site photographs, and anticipated vehicular traffic flow for use by the agencies in determining whether there are any significant natural resource or socioeconomic impacts that must be precluded or minimized. The typical types of consultations that are required, as well as guidance in conducting these consultations, are described in the following subsections.

5.1.1 Coastal Zone Protection

The Coastal Zone is defined in 49 CFR Part 194 as "All United States waters subject to the tide, United States waters of the Great Lakes and Lake Champlain, specified ports and harbors on inland rivers, waters of the contiguous zone, groundwaters, and ambient air proximal to those waters."

The Coastal Zone Management Act (CZMA) requires the USCS to ensure that their operations, activities, projects, and programs that affect the Coastal Zone in or on coastal lands or waters are consistent, to the maximum extent practicable, with the federally approved Coastal Zone Management Plan for the state. The CZMA authorizes states to administer approved coastal nonpoint pollution programs. Advance concurrence from the state Coastal Commission is required prior to taking an action affecting the use of land, water, or natural resources in the Coastal Zone. In their Coastal Zone management programs, states must list activities that directly affect the Coastal Zone and, therefore, require a consistency determination. The USCS will review these lists to identify activities applicable to the installation of VACIS which are likely to require a consistency determination.

5.1.2 Protection of Wetlands, and Floodplain Management

Executive Order (EO) 11990 "Protection of Wetlands" and EO 11988 "Floodplain Management" address the federal agency actions required to identify and protect wetlands and floodplains, minimize the risk of flood loss and destruction of wetlands, and preserve and enhance the natural and beneficial values of both floodplains and wetlands. In a Federal Register notice of 24 May 1978 (43 FR 22311), the Department of the Treasury advised, as a general rule, it does not engage in activities that would impact on floodplains or wetlands. Department of the Treasury procedures implementing these EOs are incorporated in US Treasury Directive 75-02, *Department of the Treasury's National Environmental Policy Act Implementing Procedures.*

The USCS will evaluate the potential effects of actions in floodplains, according to procedures outlined in US Treasury Directive 75-02. If required, the USCS will obtain permits from the US Army Corps of Engineers (USACE) prior to discharging dredged or fill material into waters of the US, including wetlands, in compliance with Section 404 of the Clean Water Act.

5.1.3 Endangered Species Protection

Section 7 of the Endangered Species Act of 1973 requires the USCS to consult with the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) if proposed USCS-funded projects may affect threatened and endangered species and/or their suitable habitat. The USCS will consult with the USFWS or the NMFS, as appropriate, on any USCS action(s) that may affect any federally listed threatened or endangered species or their critical habitat, in order to ensure that such actions are not likely to jeopardize the continued existence of the species or result in the destruction or adverse modification of the habitat. Such consultations may be either formal or informal. When necessary, the USCS will prepare a biological assessment of the effects of a proposed action on listed species to assist the USFWS or NMFS in issuing a biological opinion as to whether the action will jeopardize the continued existence of the species. Consideration of state-listed species is not required by the Endangered Species Act of 1973. However, state laws and regulations may govern the possession, propagation, sale, or taking of such species.

5.1.4 Historic and Archaeological Resources Protection

Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires a federal agency with jurisdiction over a federal, federally assisted, or federally licensed undertaking to take into account the effects of the agency's undertaking on properties included in, or eligible for, the National Register of Historic Places (NRHP) and, prior to approval of an undertaking, to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on the undertaking, as implemented by 36 CFR Part 800.1a.

At the earliest planning stages of any undertaking that may involve an NRHP property, the USCS will consult with the applicable State Historic Preservation Officer (SHPO). Prior to initiating consultation, the USCS must determine whether cultural properties are present in the Area of Potential Effect (APE), evaluate the property to determine the eligibility for listing in the NRHP, and evaluate the potential effects of the proposed undertaking on any NRHP-eligible property located in the APE.

5.2 GEOLOGY AND SOILS

Potential impacts related to geology and soils are primarily related to construction of structures in geologically sensitive areas, to geohazards and potential earthquake damage to proposed new facilities, and to possible impacts to soils, depending on facility siting and construction requirements.

To avoid potential impacts to unique geologic resources, the relevant county and city general plans should be consulted before siting new facilities.

5.3 AIR QUALITY

5.3.1 Air Quality Management

Air quality is managed through the Clean Air Act Amendments as well as various state Clean Air Acts. The federal and state Clean Air Acts are implemented through a three-point strategy: 1) Local controls for managing stationary, non-vehicular sources and permitting; 2) State controls for setting emissions for

motor vehicles, fuels, and consumer products; and 3) Federal controls for interstate pollutants. To further support the goal of reduced emissions, State Implementation Plans (SIPs) have been adopted as an approach to reduce air pollution, region by region, in future years. SIPs contain measures that allow each region to reach attainment status (meet the primary standard for all air quality criteria). Although federal and state governments play a role in managing the nation's air quality, the acts are implemented primarily at the local level.

At the state and county levels, air quality is managed through numerous Air Quality Management Districts (AQMDs). Each AQMD is responsible for controlling air pollution within the district to meet all state and federal air quality standards. Using regional air quality data, each AQMD adopts it own statutes to deal with the air quality problems particular to that region, including setting emission limits for stationary sources such as factories and power plants. In addition, each district develops its own clean air plan and enforces local pollution control laws.

5.3.2 Applicable Air Quality Statutes

Several statutes exist to manage air quality, and many may apply to a particular project; however, one statute in particular is, perhaps, the most applicable to potential federal projects: the New Source Review (NSR) permitting process statutes. Under this permitting process, any new potential source of emissions may have to be permitted by the AQMDs. Even temporary sources, such as increased particulate matter less than 10 micrometers in diameter (PM_{10}) due to construction, may require a permit, depending on the district and its air quality. In most cases, a permit may not be required for temporary, small-scale construction measures. However, the AQMD associated with the project must be contacted to ultimately determine regulation applicability, regardless of project scale.

5.3.3 Air Quality for the Criteria Air Pollutants

The Environmental Protection Agency (EPA) defines ambient air in 40 CFR Part 50, as "that portion of the atmosphere, external to buildings, to which the general public has access." In compliance with the 1970 Clean Air Act (CAA) and the 1977 and 1990 Amendments (CAAA), EPA has promulgated ambient air quality standards and regulations. The National Ambient Air Quality Standards (NAAQS) were enacted for the protection of the public health and welfare, allowing for an adequate margin of safety. To date, EPA has issued NAAQS for six criteria pollutants: carbon monoxide (CO), sulfur dioxide (SO_2), particles with a diameter less than or equal to a nominal 10 micrometers (PM_{10}), ozone (O_3), nitrogen dioxide (NO_2), and lead (Pb). The health and welfare effects of the applicable criteria pollutants are listed in Table II.

There are two types of air quality standards: primary and secondary. Primary standards are designed to protect sensitive segments of the population from adverse health effects, with an adequate margin of safety, which may result from exposure to criteria pollutants. Secondary standards are designated to protect human health and welfare, and therefore, in some cases, are more stringent than the primary standards. Human welfare is considered to include the natural environment (vegetation) and the man made environment (physical structures). Carbon monoxide is generated from motor vehicles and wood burning, and is a human health risk. Nitrogen dioxide is a product of combustion, and can be seen as a brown haze. Organic gases react with nitrogen dioxide to form ozone, which causes low visibility and health effects including respiratory disease and eye irritation. Particulate matter is a component of smoke, and can have a variety of health effects depending on its chemical composition. Sulfur dioxide, which is generated from burning fossil fuels, causes damage to vegetation and reduces the health of humans and

Table II. National ambient air quality standards.

POLLUTANT	STANDARD VALUE *	STANDARD TYPE
Carbon Monoxide (CO)		
8-hour Average	9 ppm (10 mg/m^3)	Primary
1-hour Average	35 ppm (40 mg/m^3)	Primary
Nitrogen Dioxide (NO_2)		
Annual Arithmetic Mean	0.053 ppm (100 $\mu g/m^3$)	Primary & Secondary
Ozone (O_3)		
1-hour Average	0.12 ppm (235 $\mu g/m^3$)	Primary & Secondary
8-hour Average **	0.08 ppm (157 $\mu g/m^3$)	Primary & Secondary
Particulate (PM_{10}) *Particles with diameters of 10 micrometers or less*		
Annual Arithmetic Mean	50 $\mu g/m^3$	Primary & Secondary
24-hour Average	150 $\mu g/m^3$	Primary & Secondary
Particulate ($PM_{2.5}$) *Particles with diameters of 2.5 micrometers or less*		
Annual Arithmetic Mean **	15 $\mu g/m^3$	Primary & Secondary
24-hour Average **	65 $\mu g/m^3$	Primary & Secondary
Sulfur Dioxide (SO_2)		
Annual Arithmetic Mean	0.03 ppm (80 $\mu g/m^3$)	Primary
24-hour Average	0.14 ppm (365 $\mu g/m^3$)	Primary
3-hour Average	0.50 ppm (1300 $\mu g/m^3$)	Secondary
Lead (Pb)		
Quarterly Average	1.5 $\mu g/m^3$	Primary & Secondary

(Source: US Environmental Protection Agency [EPA] Office of Air Quality Planning and Standards website; http://www.epa.gov/airs/criteria.html)

* Parenthetical value is an approximately equivalent concentration.

** The ozone 8-hour standard and the $PM_{2.5}$ standards are included for information only. A 1999 federal court ruling blocked implementation of these standards, which the EPA proposed in 1997. The EPA has asked the US Supreme Court to reconsider that decision.

animals. Airborne lead, which is generally produced by automobiles, can cause blood-related effects and may also affect the central nervous and reproductive systems.

Exceeding a concentration level is a violation and constitutes a nonattainment of the pollutant standard. If an air quality control region violates the National Ambient Air Quality Standards for a pollutant more than once per year, that region is defined as a nonattainment area for that pollutant.

Hazardous air pollutants, or toxic air contaminants, have no established air quality standards, but have potential cancer and noncancer health effects that are evaluated on a case-by-case basis. Hazardous air pollutants are emitted from several sources including fossil fuel burning, paints, and thinners.

5.4 HYDROLOGY AND WATER QUALITY

Federal statutes and Executive Orders, state statutes, and state agency regulations and directives protect water quality and the beneficial uses of water. Many statutes control activities that indirectly impact water quality, such as EO 11988 (Floodplain Management) and EO 11990 (Protection of Wetlands). These statutes are described in other sections of this PEA, where relevant.

5.4.1 Federal Requirements

The Clean Water Act (CWA) regulates water quality of all discharges into "waters of the United States (U.S.)." Both wetlands and "dry washes" (channels that carry intermittent or seasonal flow) are considered "waters of the U.S." Many states have adopted equivalent or more stringent statutes than the federal statutes, which are enforced by State Water Resources Control Boards (SWRCBs) and Regional Water Quality Control Boards (RWQCBs). USACE may need to be contacted under Section 404 of the CWA if a VACIS installation requires the discharge of dredged or fill materials into the waters of the US.

5.4.2 State Requirements

The SWRCBs and RWQCBs work together to protect state water resources, and are responsible for establishing water quality standards and objectives that protect the beneficial uses of different waters. RWQCBs are responsible for protecting the surface, ground, and coastal waters from pollution originating from point sources (e.g., sewage treatment plant discharge) and nonpoint sources (e.g., runoff from urban paved areas). Modifications and/or new construction of a facility may require one or more of the following permits:

- National Pollution Discharge Elimination System (NPDES) General Permit

  This permit may be required as a facility is constructed or moved and if the facility discharges any waters other than to the sanitary sewer.

- NPDES Stormwater Construction Permit

  This permit is required for any construction activity that will affect 5 acres or more, unless local restrictions impose a smaller acreage. Specifically excluded is construction activity that includes "routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility."

- NPDES Stormwater Industrial Permit

  Stormwater permits are currently required for most industrial properties. If modifications are made or if an industrial facility is relocated, the permit must be modified to reflect these changes.

Some state Departments of Fish and Game regulate alterations made to natural waterways. Modifications or new construction of facilities that may impact the volume or quality of water entering a natural waterway (such as a culvert discharging into a "dry wash") may be required to obtain a Streambed Alteration Permit.

5.4.3 County and City Requirements

Counties and cities have developed general plans that include county-specific or city-specific descriptions of existing surface and groundwater resources. Some urbanized counties and municipalities have county-wide or area-wide stormwater permits that offer guidelines and restrictions to new development that may impact modifications or construction of new facilities. Additionally, some municipalities have adopted Watershed Management Plans that may regulate or restrict modification and/or construction of facilities that discharge into waters within their plan area.

5.5 FLOODPLAINS

The term "floodplain" generally refers to the 100-year floodplain. The 100-year floodplain designates the area subject to inundation from a flood having a 1 percent chance of occurring in any given year. This flood is referred to as the "100-year flood" or "base flood" and may occur more or less often than once every 100 years. In circumstances known as "critical actions," the regulated flood-prone area is defined by the 500-year floodplain. The 500-year floodplain designates the area subject to inundation from a flood having a 0.2 percent chance of occurring in any given year.

Floodplains are designated on national Flood Insurance Rate Maps (FIRMs) or Flood Hazard Boundary Maps (FHBMs) for communities that are members of the National Flood Insurance Program (NFIP). The NFIP and its implementing regulations (44 CFR Parts 59 through 77) stipulate minimum standards for floodplain development in communities that participate in the program. Local governments incorporate these standards, or in some cases more stringent standards, into their floodplain ordinances. In addition to showing the locations of the 100-year and 500-year floodplains, many FIRMs and FHBMs show the base flood elevation (BFE), which is the estimated elevation of the 100-year flood. FIRMs and FHBMs delineate floodplains with other descriptors; the most important of these are the floodway and the 100-year coastal, high hazard floodplain. The floodway is the channel of a river or other watercourse and adjacent land areas that are required to remain free from development to discharge the base flood without cumulatively increasing the water-surface elevation. The coastal floodplain incorporates storm surges and has more stringent statutes for development than the normal 100-year floodplain, because of the velocity of waves associated with coastal flooding.

The NEPA compliance process requires federal agencies to consider direct and indirect impacts to floodplains that may result from federally funded actions. EO 11988 requires federal agencies to take action to minimize occupancy and modification of floodplains. Furthermore, EO 11988 requires that federal agencies proposing to site a project in the 100-year floodplain must consider alternatives to avoid adverse effects and incompatible development in the floodplain. If no practicable alternatives exist to siting a project in the floodplain, the project must be designed to minimize potential harm to, or within, the floodplain. Furthermore, a notice must be publicly circulated explaining the project and the reasons for the project being sited in the floodplain.

5.6 THREATENED AND ENDANGERED SPECIES

The Endangered Species Act of 1973 (16 United States Code [USC] Sections 1531 to 1534) requires federal agencies to determine the effects of their actions on threatened and endangered species of fish, wildlife, plants, and their habitats, and take steps to conserve and protect these species. This PEA assumes that the USCS has requested consultations under Section 7 of the Endangered Species Act, as amended, for the installation of VACIS.

5.7 CULTURAL RESOURCES

In addition to review under NEPA, consideration of impacts to cultural resources is mandated under Section 106 of the National Historic Preservation Act (NHPA) and implemented by 36 CFR Part 800. Requirements include identifying significant historic properties and districts that may be affected by the proposed actions or alternatives. Historic properties are defined in 36 CFR Part 60.4 as archaeological sites, standing structures, or other historic resources listed on, or determined potentially eligible for, the NRHP.

5.8 SOCIOECONOMICS AND PUBLIC SAFETY

Impacts related to socioeconomic resources include changes to demographics, housing, employment, the local economy, and public safety hazards.

The US Department of Commerce Bureau of the Census provides much of the relevant data on demographics and housing. Although only conducted every 10 years, the US census provides the most accurate and detailed information for the years that data were acquired. In addition, the census provides the basis for most projections and estimates prepared by national, state, local, and private organizations. State, county, and city information provide census data for political subdivisions of the country, for example. In addition, census data are provided by statistical subdivision that includes (in order of decreasing size) tracts, block-numbering areas, block groups, and blocks. These statistical subdivisions of counties were delineated to be homogeneous with respect to demographics, economic status, and living conditions. Most local governments have basic demographic, economic, and employment data based on these political subdivisions.

EO 12898 requires federal agencies to make achieving environmental justice part of their mission by identifying and addressing disproportionately high and adverse public health or environmental effects of its programs, policies, and activities on minority and low-income populations. EO 12898 also tasks federal agencies to ensure that public notifications regarding environmental issues are concise, understandable, and readily accessible.

5.9 LAND USE AND ZONING

Generally, land use refers to the existing function of real property. Examples of the most common land use categories include residential, commercial, industrial, public (or institutional), recreational, agricultural, and open (or undeveloped). Many of these categories are further subdivided, for example, high-, medium-, and low-density residential or light and heavy industrial. Land uses are frequently regulated by management plans, policies, ordinances, and statutes that determine the types of uses that are allowable or protect specifically designated or environmentally sensitive uses. Virtually every level of government regulates land use. At the federal level, for example, land-use statutes range from the US Department of Agriculture restrictions to avoid soil erosion, to the designation of wilderness areas. State Planning and Zoning Laws designate areas to be protected because of scenic and scientific value, forest and agricultural importance, and potentially hazardous conditions.

Land use regulation is most common at the local level. This local land use regulation, or zoning, is the designation given by a governmental unit to classify and regulate development. These zones generally use the same terms listed above for land uses. Most incorporated cities and the incorporated areas of many counties are subject to zoning ordinances. In addition to geographically defining these zones, zoning ordinances prohibit development that is inconsistent with land uses in the given district. For example, building an industrial facility in a low-density residential district would be prohibited in most city or county zoning ordinances. Compliance with zoning ordinances is enforced by local governments as part of the building permit process.

5.10 PUBLIC SERVICES

This section considers the impacts to services provided by political jurisdiction, including police, fire, recreation, and education. Although usually provided by the private sector, medical services and utilities (including water, sewage, electricity, telephone, and natural gas) are considered public services when assessing a community's ability to handle infrastructure or demographic changes.

Guidelines and statutes regarding these resources are found at the local level. Local jurisdictions frequently establish building codes and other construction standards, and prescribe requirements for local police and fire protection. Many components of utility services are also regulated at the federal and state level; however, these regulations do not generally apply to impacts caused by USCS actions considered in this PEA.

5.11 TRANSPORTATION

State Departments of Transportation are responsible for the design, construction, and maintenance of the state highway systems, including that portion of interstate highways within each state's boundaries. The US Department of Transportation Federal Highway Administration (FHWA) provides funding and oversight of projects involving federal highways. Transportation planning agencies of local governments are responsible for design, construction, and maintenance of county and local roads. Public transportation is managed by private, public, and quasi-governmental agencies at the local level. Description of local transportation networks and impacts to traffic conditions caused by the installation and operation of VACIS systems will be addressed in individual SEAs.

5.12 NOISE

Sound is most commonly measured in decibels on the A-weighted scale, which is the scale most similar to the range of sounds that the human ear can hear. The Day-Night Average Sound Level (DNL) is an average measure of sound. It takes into account the volume of each sound incident, the number of times each incident occurs, and the time of day each incident occurs (nighttime sound being weighted more heavily because it is assumed to be more annoying to the community). The DNL descriptor is accepted by federal agencies as a standard for estimating sound impacts and establishing guidelines for compatible land uses.

Noise, as unwanted or unwelcome sound, is federally regulated by the Noise Control Act of 1972 (NCA). Although the NCA tasks the EPA to prepare guidelines for acceptable ambient noise levels, it only charges those federal agencies that operate noise-producing facilities or equipment to implement noise standards. By nature of its mission, the USCS does not have statutes defining noise.

Work place noise standards are set by the Occupational Safety and Health Administration (OSHA)[21] and are measured in two ways: a standard of 90 dBA for a duration of 8 hours is the limit for constant noise (variations in noise levels up to 115 dBA at intervals of 1 second or less, are considered to be continuous),

and a maximum sound level for impulse noise is 140 dBA. Impulse noise is any short blast, less than one second in duration. The EPA's guidelines (and those of many federal agencies) state that outdoor sound levels in excess of 55 decibel DNL are "normally unacceptable" for noise-sensitive land uses such as residences, schools, and hospitals. Most states delegate the authority to regulate ambient noise to local jurisdictions.

5.13 HAZARDOUS MATERIALS AND WASTES

Hazardous materials and wastes are regulated via a combination of federally and state mandated laws. A hazardous substance is defined as:

- Any substance designated pursuant to Section 311(b)(2)(A) of the CWA, as amended (33 USC Section 466 et seq.)
- Any toxic pollutant listed under Section 307(a) of the CWA, as amended (33 USC Section 466 et seq.)
- Any element, compound, mixture, solution, or substance designated pursuant to Section 102 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended (42 USC Section 9601 et seq.)
- Any hazardous air pollutant listed under Section 112 of the Clean Air Act, as amended (42 USC Section 1857 et seq.)
- Any imminently hazardous chemical substance or mixture with respect to which the EPA has taken action pursuant to Section 7 of the Toxic Substance Control Act, as amended (15 USC Section 2601 et seq.)
- Any substance as defined by a State Code for Hazardous Waste Control

A hazardous substance does not include petroleum, natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel. Hazardous substances should be disposed of in accordance with all federal and state hazardous waste regulations.

Section 6
ENVIRONMENTAL CONSEQUENCES

For each specific VACIS installation, a site-specific SEA will be prepared by the USCS as described in Section 1.3 herein. Therefore, the potential impacts and mitigation measures described in this section would be augmented by a discussion of environmental consequences in each SEA based on a specific project area.

6.1 GEOLOGY AND SOILS

6.1.1 No Action Alternative

Under the No Action alternative, current USCS inspection operations will continue as normal. There will not be a requirement for the facility construction or modification that may be associated with VACIS installation. Consequently, there will be no impact to geology or soils.

6.1.2 Acquisition of VACIS

Preparing and installing the VACIS family of equipment will require minimal construction at USCS border crossings and ports of entry. Construction will occur on already-disturbed areas, is consistent with current land uses, and will be in accordance with all building codes and special earthquake provisions.

VACIS II and Mobile VACIS sites will be located at already-developed port and border stations that are paved with asphalt or concrete. The VACIS II operator station will be located in a permanent structure, semi-permanent structure, or mobile van. At those sites where the weather is often particularly harsh, entire VACIS II and Mobile VACIS systems may be located in an existing or newly-constructed building. In these cases, existing warehouse buildings may be used, or the construction of prefabricated buildings on a concrete foundation may be preferred. In either case, excavation or removal of soil is not anticipated.

Rail VACIS sites may be located at already-developed port and border stations that are paved with asphalt or concrete, or may also be located along railroad rights-of-way. These sites will require the construction of a small concrete pier at least 20 feet into the ground for installation of the detector array tower, the construction of a concrete pad for installation of the radiation source, a small cleared site for the operator station. The operator station may be located in a permanent structure, semi-permanent structure, or mobile van, depending on local site requirements.

Construction may cause potential short-term erosion and soil loss; however, applying appropriate best management practices (BMPs) during construction can mitigate these impacts. Impacts to geological resources and impacts from geo-hazards can be minimized by appropriate siting of facilities and by applying appropriate geo-technical construction. Furthermore, building design in compliance with EO 12699, "Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction" and local codes and standards, can minimize effects of seismic activity.

6.2 AIR QUALITY

6.2.1 No Action Alternative

Under the No Action alternative, as congestion and traffic increase, air quality at ports of entry and border crossings will likely worsen as more trucks wait longer to pass through the inspection process. It should be noted however, that the fielding and operation of VACIS systems will result in an increase in the number of vehicles inspected once inside the port facility, but will not affect the amount of time required for vehicles to cross the border or enter ports of entry.

6.2.2 Acquisition of VACIS

In deploying VACIS, minimal quantities of fugitive dust (PM_{10}) may be produced as a result of construction activities. Other short-term impacts to air quality from construction activities include carbon monoxide and nitrogen oxides emissions resulting from fossil-fuel burning construction vehicles and equipment, and emissions of reactive organic gases (ROGs) and hazardous air pollutants from paints, thinners, and other solvents used at construction sites. The implementation of BMPs during construction can keep emissions to negligible levels. Examples of BMPs for construction activities include watering disturbed areas, siting of staging areas to minimize fugitive dust, and keeping construction vehicle engines tuned properly. Quantities of these pollutants will likely be negligible.

6.2.2.1 Idling Vehicle Emissions Calculations

Air quality impacts resulting from motor vehicle emissions will primarily be the result of idling. As with driving emissions, idle emissions are affected by a number of parameters. For analyses not requiring detailed specific emission estimates tailored to local conditions, the summary of idle emission factors found in Tables III and IV can be used to obtain first-order approximations of emissions under idle conditions.

The following acronyms and abbreviations are used in the tables:

- CO: Carbon monoxide
- GVW: Gross vehicle weight
- NOx: Oxides of nitrogen (mostly NO and NO_2)
- PM_{10}: Particulate matter, diameter = 10 microns
- psi: Pounds per square inch
- RVP: Reid vapor pressure, a common method of expressing the volatility (tendency to evaporate) of gasoline; RVP is vapor pressure measured at 100 degF (38 degC).
- VOC: Volatile organic compounds (for vehicles, this refers to exhaust emissions from incomplete combustion of gasoline, which is composed of a blend of hydrocarbon compounds)

Additionally, the following vehicle types are used in the tables:

- LDGV: Light-duty gasoline-fueled vehicles, up to 6000 lb Gross Vehicle Weight (GVW) (gasoline-fueled passenger car)
- LDGT: Light-duty gasoline-fueled trucks, up to 8500 lb GVW (includes pick-up trucks, minivans, passenger vans, sport-utility vehicles, etc.)
- HDGV: Heavy-duty gasoline-fueled vehicles, 8501+ lb GVW (gas heavy-duty trucks)
- LDDV: Light-duty diesel vehicles, up to 6000 lb GVW (passenger cars with diesel engines)
- LDDT: Light-duty diesel trucks, up to 8500 lb GVW (light trucks with diesel engines)

- HDDV:Heavy-duty diesel vehicles, 8501+ lb GVW (diesel heavy-duty trucks)
- MC: Motorcycles (only those certified for highway use; all gasoline-fueled)

Table III. Idle emission factors, winter conditions (30 degF, 13.0 psi RVP gasoline).

Pollutant	Units	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
VOC	g/hr	21.1	30.7	44.6	3.63	4.79	12.6	20.1
	g/min	0.352	0.512	0.734	0.061	0.080	0.211	0.335
CO	g/hr	371	487	682	10.1	11.5	94.6	388
	g/min	6.19	8.12	11.4	0.168	0.191	1.58	6.47
NOx	g/hr	6.16	7.47	11.8	6.66	6.89	56.7	2.51
	g/min	0.103	0.125	0.196	0.111	0.115	0.945	0.042

Source: EPA420-F-014, *Emission Facts, Idling Vehicle Emissions*, United States EPA, Air and Radiation, Office of Mobile Sources, April 1998

Table IV. Idle emission factors, summer conditions (75 degF, 9.0 psi RVP gasoline).

Pollutant	Units	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
VOC	g/hr	16.1	24.1	35.8	3.53	4.63	12.5	19.4
	g/min	0.269	0.401	0.597	0.059	0.077	0.208	0.324
CO	g/hr	229	339	738	9.97	11.2	94.0	435
	g/min	3.82	5.65	12.3	0.166	0.187	1.57	7.26
NOx	g/hr	4.72	5.71	10.2	6.50	6.67	55.0	1.69
	g/min	0.079	0.095	0.170	0.108	0.111	0.917	0.028

Source: EPA420-F-014, *Emission Facts, Idling Vehicle Emissions*, United States EPA, Air and Radiation, Office of Mobile Sources, April 1998

The tables present emission factors, in grams per hour (g/hr) and grams per minute (g/min) of idle time, for volatile organic compounds (VOC), carbon monoxide (CO), and nitrogen oxides (NOx). Idle emissions of particulate matter (PM_{10}) are provided for heavy-duty diesel vehicles only; PM_{10} emissions from gasoline-fueled vehicles are negligible, especially when the elimination of lead in gasoline and reductions of sulfur content are accounted for. Emission factors are provided for both summer and winter conditions for VOC, CO, and NOx. These idle emission factors are from EPA's MOBILE5b highway vehicle emission factor model (VOC, CO, NOx) and EPA's PART5 model (PM_{10} for heavy-duty diesel vehicles only). These emission factors are national averages for all vehicles in the in-use fleet of 1 January 1998 (winter) or 1 July 1998 (summer). PM_{10} idle emission factors for heavy-duty diesels are as of 1 January 1998.

6.2.2.2 Particulate Matter Emissions

The only vehicle category for which EPA has idle PM_{10} emission factors is heavy-duty diesels. Particulate emissions are also observed to be relatively insensitive to temperature, and so "winter" and "summer" emission factors for idle PM_{10} are the same. These emissions are summarized in Table V.

Table V. Particulate matter emission factors.

Engine Size	Emissions
Light/Medium HDDVs (8501-33,000 lb GVW)	2.62 g/hr (0.044 g/min)
Heavy HDDVs (33,001+ lb GVW)	2.57 g/hr (0.043 g/min)
HDD buses (all buses, urban and inter-city travel)	2.52 g/hr (0.042 g/min)
Average of all heavy-duty diesel engines	2.59 g/hr (0.043 g/min)

Source: EPA420-F-014, *Emission Facts, Idling Vehicle Emissions*, United States EPA, Air and Radiation, Office of Mobile Sources, April 1998

6.2.2.3 Potential Vehicle Idling Emissions Resulting from the Operation of VACIS

Tables VI, VII, and VIII represent the idling vehicle emissions likely to result from the operation of VACIS. Calculations were made based on the following assumptions: 1) VACIS processes 10 vehicles per hour; 2) VACIS will be operated during two 8-hour work shifts (16 hours) equaling 160 inspections per day; 3) At any given time during each work shift, one vehicle will be undergoing inspection by VACIS, and five vehicles will be queued for inspection; 4) The vehicle undergoing inspection and all queued vehicles will be idling; and, therefore 5) Calculated emissions are equivalent to six vehicles of each type shown idling simultaneously over a period of 16 hours per day.

Table VI. Idling emissions, winter conditions (30 degF 13.0 psi RVP gasoline), January-June.

Pollutant	Units	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
VOC	lb/hr	0.282	0.408	0.588	0.048	0.066	0.168	0.264
	lb/day	4.512	6.528	9.408	0.768	1.056	2.688	4.224
	lb/half yr	823.44	1191.36	**1716.96**	140.16	192.72	490.56	770.88
	lb/yr	1646.88	2382.72	**3433.92**	280.32	385.44	981.18	1541.76
	tons/half yr	0.408	0.594	**0.858**	0.066	0.096	0.240	0.384
	tons/yr	0.816	1.188	**1.716**	0.132	0.192	0.480	0.768
CO	lb/hr	4.908	6.444	9.024	0.132	0.150	1.254	5.130
	lb/day	78.528	103.104	144.384	2.112	2.400	20.064	82.080
	lb/half yr	14331.36	18816.48	**26350.08**	385.44	438.00	3661.68	14979.60
	lb/yr	28662.72	37632.96	**52700.16**	770.88	876.00	7323.36	29959.20
	tons/half yr	7.164	9.408	**13.170**	0.192	0.216	1.830	7.488
	tons/yr	14.328	18.816	**26.340**	0.384	0.432	3.660	14.976
NOx	lb/hr	0.084	0.096	0.156	0.090	0.090	0.750	0.036
	lb/day	1.344	1.536	2.496	1.440	1.440	12.000	0.576
	lb/half yr	245.28	280.32	455.52	262.80	262.80	**2190.00**	105.12
	lb/yr	490.56	560.64	911.04	525.60	525.60	**4380.00**	210.24
	tons/half yr	0.120	0.138	0.222	0.126	0.126	**1.092**	0.048
	tons/yr	0.240	0.276	0.444	0.252	0.252	**2.184**	0.096

Table VII. Idling emissions, summer conditions (75 degF 9.0 psi RVP gasoline), July-December.

Pollutant	Units	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
VOC	lb/hr	0.210	0.318	0.474	0.048	0.060	0.168	0.258
	lb/day	3.36	5.088	7.584	0.768	0.960	2.688	4.128
	lb/half yr	613.20	928.56	**1384.08**	140.16	175.20	490.56	753.36
	lb/yr	1226.40	1857.12	**2768.16**	280.32	350.40	981.18	1506.72
	tons/half yr	0.306	0.462	**0.690**	0.660	0.084	0.240	0.372
	tons/yr	0.612	0.924	**1.380**	1.320	0.168	0.480	0.744
CO	lb/hr	3.030	4.482	9.762	0.132	0.150	1.242	5.754
	lb/day	48.48	71.712	156.192	2.112	2.400	19.872	92.064
	lb/half yr	8847.60	13087.44	**28505.04**	385.44	438.00	3626.64	16801.68
	lb/yr	17695.20	26174.88	**57010.08**	770.88	876.00	7253.28	33603.36
	tons/half yr	4.422	6.540	**14.250**	0.192	0.216	1.812	8.400
	tons/yr	8.844	13.080	**28.500**	0.384	0.432	3.624	16.800
NOx	lb/hr	0.060	0.078	0.132	0.084	0.090	0.726	0.024
	lb/day	0.960	1.248	2.112	1.344	1.440	11.616	0.384
	lb/half yr	175.20	227.76	385.44	245.28	262.80	**2119.92**	70.08
	lb/yr	350.40	455.52	770.88	490.56	525.60	**4239.84**	140.16
	tons/half yr	0.084	0.108	0.192	0.120	0.126	**1.056**	0.030
	tons/yr	0.168	0.216	0.384	0.240	0.252	**2.112**	0.060

Table VIII. Particulate matter emissions (PM_{10}), January-December.

Pollutant	Units	Light/Medium HDDV	Heavy HDDV	HDD Buses	Average of all Heavy Duty Diesel Engines
PM_{10}	lb/hr	0.036	0.036	0.036	0.036
	lb/day	0.576	0.576	0.576	0.576
	lb/half yr	105.12	105.12	105.12	**105.12**
	lb/yr	210.24	210.24	210.24	**210.24**
	tons/half yr	0.048	0.048	0.048	**0.048**
	tons/yr	0.096	0.096	0.096	**0.096**

6.2.2.4 Worst Case Idling Vehicle Emissions

Using an equal split of 6 months per "winter" and "summer" emissions factors, analysis of the data provided shows that the worst-case scenario (operating only that vehicle type with the highest emission rate) would result in the impacts as shown in Table IX.

Table IX. Worst case idling vehicle emissions.

Pollutant	Units (tons/yr)	Vehicle Type
VOC	1.548	HDGV
CO	27.420	HDGV
NOx	2.148	HDDV
Particulate Matter	0.096	All

These estimates show that yearly emissions attributable to idling vehicles are well below the allowable limits set in 40 CFR Part 93.153, *Determining Conformity of Federal Actions to State or Federal Implementation Plans* (the rule). The rule applies to those federal actions which are located in areas of nonattainment of the National Ambient Air Quality Standards (NAAQS).

The rates shown in Table X are those applicable to nonattainment areas (NAA's).

Table X. Conformity criteria for nonattainment areas.

Pollutant	Tons/year
Ozone (VOCs or NOx)	
Serious NAA's	50
Severe NAA's	25
Extreme NAA's	10
Other ozone NAA's outside an ozone transport region	100
Marginal and moderate NAA's inside an ozone transport region	
VOC	50
NOx	100
Carbon Monoxide All NAA's	100
SO_2 or NO_2 All NAA's	100
PM-10	
Moderate NAA's	100
Serious NAA's	70
Pb All NAA's	25

Source: 40 CFR Part 93.153, *Determining Conformity of Federal Actions to State or Federal Implementation Plans*

The rates shown in Table XI are those applicable to maintenance areas.

Table XI. Conformity criteria for maintenance areas.

Pollutant	Tons/Year
Ozone (NOx), SO_2 or NO_2 All Maintenance Areas	100
Ozone (VOCs):	
Maintenance areas inside an ozone transport region	50
Maintenance area outside an ozone transport region	100
Carbon Monoxide All Maintenance Areas	100
PM-10: All maintenance Areas	100
Pb: All maintenance Areas	25

Source: 40 CFR Part 93.153, *Determining Conformity of Federal Actions to State or Federal Implementation Plans*

6.3 HYDROLOGY AND WATER QUALITY

6.3.1 No Action Alternative

Under this alternative, impacts to water quality at existing ports of entry and border crossings will not change. Hydrology is not expected to be impacted as a result of implementing the no action alternative.

6.3.2 Acquisition of VACIS

Construction related to the installation of VACIS has the potential to cause increased runoff and sedimentation during construction, and in the period between construction and vegetation re-establishment. These impacts can be mitigated by implementing stormwater and erosion-control BMPs during construction. In general, construction BMPs include erosion- and sediment-control techniques to limit the exposure and transport of sediment, methods to minimize contact of stormwater with construction materials and wastes, proper vehicle maintenance and fueling practices, and minimizing off-site tracking of sediment.

A National Pollution Discharge Elimination System (NPDES) General Permit or an NPDES Stormwater Construction Permit may be required for new construction. The USCS will confer with Regional Water Quality Control Boards to determine permit requirements.

Due to minimal civil construction requirements associated with VACIS surface runoff will be negligible. No impacts to hydrology are expected as a result of this alternative.

6.4 FLOODPLAINS

6.4.1 No Action Alternative

The No Action alternative is not expected to result in direct or indirect impacts to the floodplain.

6.4.2 Acquisition of VACIS

Under this alternative, structures associated with the installation and operation of VACIS will be built in compliance with EO 11988 and 44 CFR Part 9; therefore, a federally funded facility cannot be sited in a 100-year floodplain unless there are no reasonable alternatives. Except in these rare circumstances, there will be no impact to the floodplain.

If structures associated with the installation and operation of VACIS are constructed within a 100-year floodplain, the structures will be elevated or floodproofed in compliance with the National Flood Insurance Program and local floodplain ordinances. In compliance with 44 CFR Part 9, a notice will be publicly circulated explaining the project and identifying the reasons for the project being sited in the floodplain.

6.5 BIOLOGICAL RESOURCES

6.5.1 No Action Alternative

This alternative will have little or no direct impact on biological resources in the project area.

6.5.2 Acquisition of VACIS

Activities associated with this alternative are primarily construction-related and will not have an adverse affect on biological resources in the project area. Most of the construction will occur on concrete and asphalt surfaces in industrial sites. Construction of Rail VACIS installations may result in the disturbance of a limited amount of existing vegetation and the loss of associated wildlife habitat within the footprint of the detector array, radiation source, and operator station. Vegetation management within these areas will not have adverse effects on biological resources in the immediate vicinity of the Rail VACIS installation.

Construction and operation of VACIS is not expected to have an impact on wetlands or waters of the US. If a project will affect wetlands, the USCS will contact the US Army Corps of Engineers (USACE) and local authorities to apply for, and receive, a Section 404 Permit for wetland activities. The USCS will mitigate damage to wetlands per the Section 404 Permit, and otherwise comply with EO 11990.

Permits from the USACE will be required if any streams or other watercourses are impacted. Coordination with the US Fish and Wildlife Service, state, and local authorities, as well as compliance with local statutes, will be required.

6.6 THREATENED AND ENDANGERED SPECIES

6.6.1 No Action Alternative

Activities associated with the No Action alternative will not have a direct impact on proposed or listed threatened and endangered species.

6.6.2 Acquisition of VACIS

Activities associated with this alternative are primarily related to construction and operation of VACIS in industrial settings (border crossings, ports of entry) and is not expected to have a direct impact on proposed or listed threatened and endangered species.

Construction of Rail VACIS may disturb the area within the footprint of the detector array, radiation source, and operator station. The probability is low that the ingress and egress of equipment and personnel can adversely affect proposed or listed species present in the immediate vicinity of the Rail VACIS installation. Potential impacts will be short-term and may include disturbance/displacement of individuals, and incidental disruption of suitable habitat.

If federally listed or proposed threatened and endangered species have the potential to be impacted, the USCS will initiate consultation with USFWS or NMFS, in compliance with Section 7 of the Endangered Species Act. Potential impacts to federally listed or proposed threatened and endangered species will be evaluated and documented in an SEA.

6.7 CULTURAL RESOURCES

may want to use wording similar to 6.6

6.7.1 No Action Alternative

Under this alternative, the USCS will not fund any alternative action and, as a result, no further cultural resources studies will be required under Section 106 of the National Historic Preservation Act (NHPA).

6.7.2 Acquisition of VACIS

Under this alternative, construction and operation of VACIS is not anticipated to occur in historic districts that are listed on, or potentially eligible for, the National Register of Historic Places (NRHP).

6.8 SOCIOECONOMICS

6.8.1 No Action Alternative

Under the No Action alternative, USCS inspections of vehicles will be conducted as they are today. Vehicle backups will likely worsen as more trucks will wait longer to pass through the inspection process. This can result in adverse impacts to businesses that depend on the timely flow of goods across the border. As noted in Section 6.2.1 herein, the fielding and operation of VACIS will not directly impact (positively or negatively) the waiting time associated with entry into the US.

6.8.2 Acquisition of VACIS

Population will not be impacted because this alternative will not displace persons and business to other locations or attract new population to the project area. Housing resources will not be impacted because the population demand for these necessities will not increase with this alternative. This alternative is not expected to impact property values. Impacts to the local economy, as a whole, will be negligible. Demographic and economic indicators for local residents will be studied to determine whether a disproportionate number (defined as greater than 50 percent) of minority or low-income persons may be adversely affected by the alternative. Potential environmental justice impacts (per EO 12898) will be addressed in an SEA.

6.9 LAND USE AND ZONING

6.9.1 No Action Alternative

No change in land use and zoning will occur under the No Action alternative.

6.9.2 Acquisition of VACIS

The installation and operation of VACIS proposed under this alternative will not impact land use or zoning. Buildings that currently comply with local zoning ordinances will not impact land use or zoning as a result of making improvements. However, improvements are generally prohibited for properties with nonconforming uses unless the structure is brought into compliance. A nonconforming use is one that is currently out of compliance with the zoning ordinance, usually because the structure was built before the current zoning regulation was executed. In such cases, local governments may consider granting variances so that properties with nonconforming uses can be improved without making other structural changes necessary to comply with the zoning ordinance. Otherwise, the USCS may seek a variance or an amendment to the zoning designation so that the proposed use complies.

6.10 PUBLIC SERVICES

6.10.1 No Action Alternative

The No Action alternative will not affect communities' requirements for public services.

6.10.2 Acquisition of VACIS

Under this alternative, sufficient public service utility capacity exists at ports of entry and border crossings to adequately handle operation of VACIS installations.

6.11 TRANSPORTATION

6.11.1 No Action Alternative

Under the No Action alternative, it is assumed that traffic will increase at ports of entry.

6.11.2 Acquisition of VACIS

Temporary detours, traffic delays, and congestion may occur during construction activities. These temporary impacts will be mitigated by coordinating detour routes and signs with appropriate cognizant agencies.

6.12 NOISE

6.12.1 No Action Alternative

Under the No Action alternative, USCS-funded alternative actions will not be pursued and, therefore, will not generate any noise in additional to the noise already existing at ports of entry and border crossings.

6.12.2 Acquisition of VACIS

Noise created from the installation and operation of VACIS will be negligible. Minor modifications and improvements to existing structures, and construction of new facilities, may create temporary noise. Activities related to this alternative will comply with local ordinances pertaining to noise levels and hours of operation.

6.13 HAZARDOUS MATERIALS AND WASTES

6.13.1 No Action Alternative

Under the No Action alternative, there will not be an increase, nor a decrease, in the use of hazardous materials or the generation of hazardous wastes.

6.13.2 Acquisition of VACIS

The construction of VACIS facilities has the potential to result in impacts from hazardous wastes or materials. Construction activities will follow legal requirements for storage, handling, and use of hazardous materials and wastes. Operation and maintenance of VACIS has little potential impact associated with hazardous materials and wastes. Activities including greasing of VACIS II tracks and refueling of Mobile VACIS will follow legal requirements for storage, handling, and use of hazardous materials and wastes.

6.14 RADIOLOGICAL IMPACTS

6.14.1 No Action Alternative

Under the No Action alternative, there will be no changes to the radiological consequences associated with current USCS methods for vehicle inspections.

6.14.2 Acquisition of VACIS

Since nuclear radiation affects people, it is important to be able to measure its presence. It is also important to relate the amount of radiation received by the body to its physiological effects. Two terms used to relate the amount of radiation received by the body are exposure and dose. When a person is exposed to radiation, the body absorbs a dose of radiation. As in most measurement quantities, certain units are used to properly express the measurement, as shown below:

- rad (radiation absorbed dose) – Different materials that receive the same exposure may not absorb the same amount of energy. The rad is the basic unit of the absorbed dose of radiation. It was developed to relate the different types of radiation (i.e., alpha, beta, gamma, and neutron) to the energy they impart in materials. The dose of one rad indicates the absorption of 100 ergs (an erg is a small but measurable amount of energy) per gram of absorbing material. One roentgen of gamma radiation exposure results in about one rad of absorbed dose. To indicate the dose an individual receives in the unit rad, the word "rad" follows immediately after the magnitude, for example, "50 rad." One thousandth of a rad is abbreviated "mrad," and one millionth of a rad is abbreviated "μrad."

- rem (roentgen equivalent man) – Some types of nuclear radiation produce greater biological effects for the same amount of energy imparted than other types. The rem is a unit that relates the dose of any radiation to the biological effect of that dose. Therefore, to relate the absorbed dose of specific types of radiation, a "quality factor" must be multiplied by the dose in rad. To indicate the dose an individual receives in the unit rem, the word "rem" follows immediately after the magnitude, for example, "50 rem." One thousandth of a rem is abbreviated "mrem," and one millionth of a rem is abbreviated "μrem." For the gamma rays used in VACIS, the quality factor is 1, meaning that 1 rad of exposure results in 1 rem of dose.

6.14.2.1 Regulations and Dose Criteria

The Nuclear Regulatory Commission (NRC) promulgates regulations and establishes standards for protection against radiation arising out of activities conducted under licenses issued by the Commission. These requirements, which are set forth in Title 10 of the *Code of Federal Regulations*, 10 CFR Part 20 state:

> Persons engaged in [licensed] activities...shall, in addition to complying with the requirements set forth in this part, make every reasonable effort to maintain radiation exposures, and releases of radioactive effluents into unrestricted areas, as low as is reasonably achievable. The term "as low as is reasonably achievable" means as low as is reasonably achievable taking into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to the utilization of atomic energy in the public interest.

The USCS has implemented the As Low As is Reasonably Achievable (ALARA) principle. Under the ALARA principle, the radiation exposure to workers and individual members of the general public shall be kept as low as is reasonably achievable, taking into consideration the economics of the situation and the benefits to society.[22]

In 10 CFR Part 20, the NRC identifies two classifications of radiation dose to people. The first classification is "Occupational Dose", as defined below:

> "*Occupational dose* means the dose received by an individual in the course of employment in which the individual's assigned duties involve exposure to radiation or to radioactive material from licensed and unlicensed sources of radiation, whether in the possession of the licensee or other person. Occupational dose does not include dose received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released in accordance with §35.75, from voluntary participation in medical research programs, or as a member of the public."

The individuals subject to the Occupational Dose classification must closely monitor their degree of radiation exposure using dosimeters.

The second radiation dose classification is "Public Dose", as defined below:

> "*Public dose* means the dose received by a member of the public from exposure to radiation or radioactive material released by a licensee, or to any other source of radiation under the control of a licensee. Public dose does not include occupational dose or doses received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released in accordance with §35.75, or from voluntary participation in medical research programs."

As promulgated by the NRC in 10 CFR Part 20, the maximum permissible level of radiation dose to the general public in unrestricted areas (i.e., Public Dose) is 0.1 rem (100 mrem; 100,000 μrem) per year above the 0.36 rem (360 mrem; 360,000 μrem) per year dose provided by natural background and man-made radiation.

As part of its ALARA program, the USCS will establish a physical radiation safety exclusion zone around each VACIS installation, as described in Section 6.14.2.3 herein, to protect the general public from radiation emissions in accordance with the maximum dose permitted under 10 CFR Part 20.[23]

6.14.2.2 Exposure Pathways

The radiation exposure pathway for the general public in unrestricted areas is created from direct exposure to scatter radiation from the radioactive source (^{137}Cs) used in each VACIS configuration, while the shutter is open during cargo scanning operations. However, in all cases, the radiation dose received by the general public will not exceed 0.1 rem (100 mrem; 100,000 µrem) per year above the 0.36 rem (360 mrem; 360,000 µrem) per year dose provided by natural background and man-made radiation, which is the whole body exposure limit for members of the general public.[24]

The USCS has chosen the upper permissible level of radiation dose of its workers to be the same as that of the general public in unrestricted areas. Adhering to this criterion, Customs inspectors are not designated as occupational radiation workers. The USCS has chosen the criterion of 2000 hours per year as the typical time of exposure for its workers (which is considered the worst-case exposure regime for any individual, general public or otherwise). Based on this time of exposure, and based on the Public Dose criterion of 0.1 rem (100 mrem; 100,000 µrem) per year, a typical Customs inspector who is assigned at a VACIS operational site cannot experience a radiation dose greater than 0.00005 rem (0.05 mrem; 50 µrem) per hour above the 0.00018 rem (0.18 mrem; 180 µrem) per hour dose provided by natural background and man-made radiation.[25]

typical

6.14.2.3 Radiation Safety Exclusion Zones[26]

In order to limit VACIS radiation dose to no more than 0.00005 rem (0.05 mrem; 50 µrem) per hour above the 0.00018 rem (0.18 mrem; 180 µrem) per hour dose provided by natural background and man-made radiation, radiation safety exclusion zones have been established for VACIS II, Mobile VACIS, and Rail VACIS. Neither the general public nor USCS personnel will be allowed in the radiation safety exclusion zones during VACIS operations. The radiation safety exclusion zones for the three VACIS configurations were established from field measurements conducted by a Certified Health Physicist, and are described in the following subsections.

6.14.2.3.1 VACIS II

The radiation safety exclusion zone for VACIS II is 110 feet in length and 65 feet in width, as depicted in Figure 8. At the edges of this radiation safety exclusion zone, the radiation dose will not exceed 0.00005 rem (0.05 mrem; 50 µrem) per hour above the 0.00018 rem (0.18 mrem; 180 µrem) per hour dose provided by natural background and man-made radiation. Additional discussions regarding the VACIS II radiation source may be found in *Registry of Radioactive Sealed Sources and Devices; Safety Evaluation of Device; Model – VACIS II; No. CA0215D104G; Date – 18 August 2000*, which is included as Appendix A herein.

6.14.2.3.2 Mobile VACIS

The radiation safety exclusion zone for Mobile VACIS is 50 feet in length and 50 feet in width, as depicted in Figure 9. At the edges of this radiation safety exclusion zone, the radiation dose will not exceed 0.00005 rem (0.05 mrem; 50 µrem) per hour above the 0.00018 rem (0.18 mrem; 180 µrem) per hour dose provided by natural background and man-made radiation. Additional discussions regarding the Mobile VACIS radiation source may be found in *Registry of Radioactive Sealed Sources and Devices;*

Safety Evaluation of Device; Model – Mobile VACIS; No. CA0215D103S; Date – 24 August 2000, which is included as Appendix B herein.

6.14.2.3.3 Rail VACIS

The radiation safety exclusion zone for Rail VACIS is 50 feet in length and 20 feet in width, as depicted in Figure 10. At the edges of this radiation safety exclusion zone, the radiation dose will not exceed 0.00005 rem (0.05 mrem; 50 µrem) per hour above the 0.00018 rem (0.18 mrem; 180 µrem) per hour dose provided by natural background and man-made radiation. At present, there is no "Registry of Radioactive Sealed Sources and Devices" document that addresses the Rail VACIS radiation source.

6.14.2.4 Effects of Irradiation on Cargo

Cargo is subjected daily to radiation exposures without protective measures above those that they would receive normally. The total radiation dose experienced by cargo subjected to VACIS scanning is approximately 0.000005 rem (0.005 mrem; 5 µrem) per scan, which is approximately five orders of magnitude below the 0.360 rem (360 mrem; 360,000 µrem) per year dose experienced as a result of natural and man-made background radiation.

A USCS Memorandum for Record from Dr. Siraj M. Kahn, Certified Health Physicist, dated 22 November 1999, addresses VACIS compliance with US Food and Drug Administration regulations regarding irradiation of food. This memorandum states:

> "Title 21, Part 179, Subpart B, Section 179.21, Paragraph (b) (2) (ii) of the Code of Federal Regulations (CFR) requires that a statement that no food shall be exposed to radiation sources listed in paragraph (a) (1) and (2) of that section so as to receive an absorbed dose in excess of 10 grays (1000 rads) [1000 rem] be attached to equipment using these radiation sources.
>
> The Vehicle and Cargo Inspection System (VACIS) uses a sealed cesium-137 source for the inspection of trucks, cargo containers, railcars and other vehicles. A radiation safety survey was performed in 1996 on a prototype VACIS using a one curie cesium-137 source. Subsequent calculations based on those measurements indicate that the radiation dose to food at the center of the truck is 5 microrad which is a billions times less than that allowed by this regulation. Details of these calculations are presented in the technical report entitled Radiation Safety Guidelines for a Contraband Detection System dated November, 1996. The radiation dose to food from mobile VACIS and railroad VACIS will be about 8 and 10 microrad, respectively, because they use 1.6 and 2 curie radiation sources.
>
> Based on the above discussion, the VACIS equipment (fixed truck, mobile and railroad) is in full compliance with 21 CFR 179.21."

6.14.2.5 Effects of Irradiation on Persons

As stated in Section 6.14.2.1 herein, the NRC has established the maximum allowable value of radiation dose that may be received by workers in unrestricted areas (individual members of the public) to be 0.1 rem (100 mrem; 100,000 µrem) per year above the 0.36 rem (360 mrem; 360,000 µrem) per year dose provided by natural background and man-made radiation. Also, as stated in Section 6.14.2.4 herein, the maximum radiation dose experienced during a VACIS scan (i.e., during Rail VACIS operations) is approximately 0.000010 rem (0.01 mrem; 10 µrem) per scan.

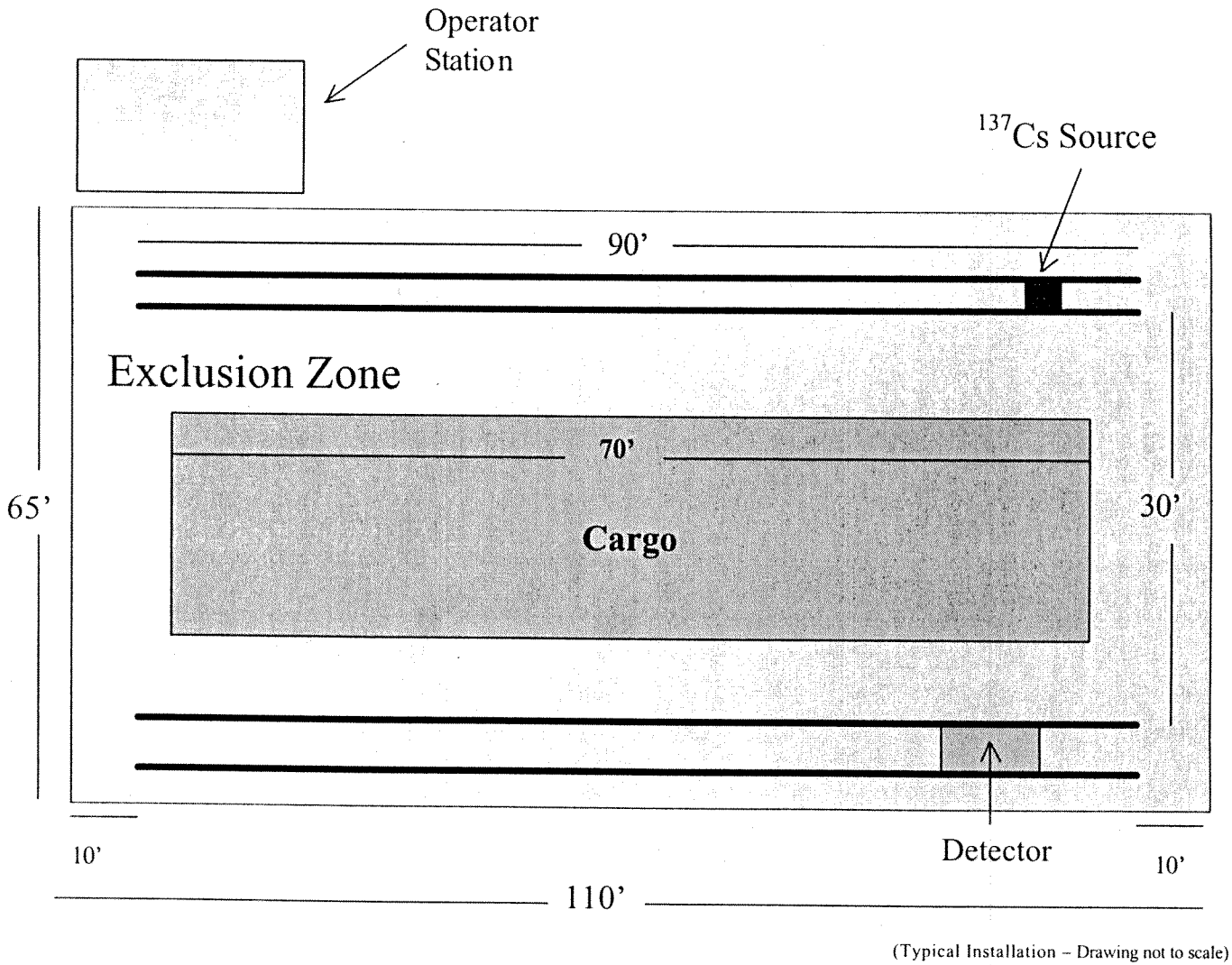


Figure 8. VACIS II radiation safety exclusion zone.

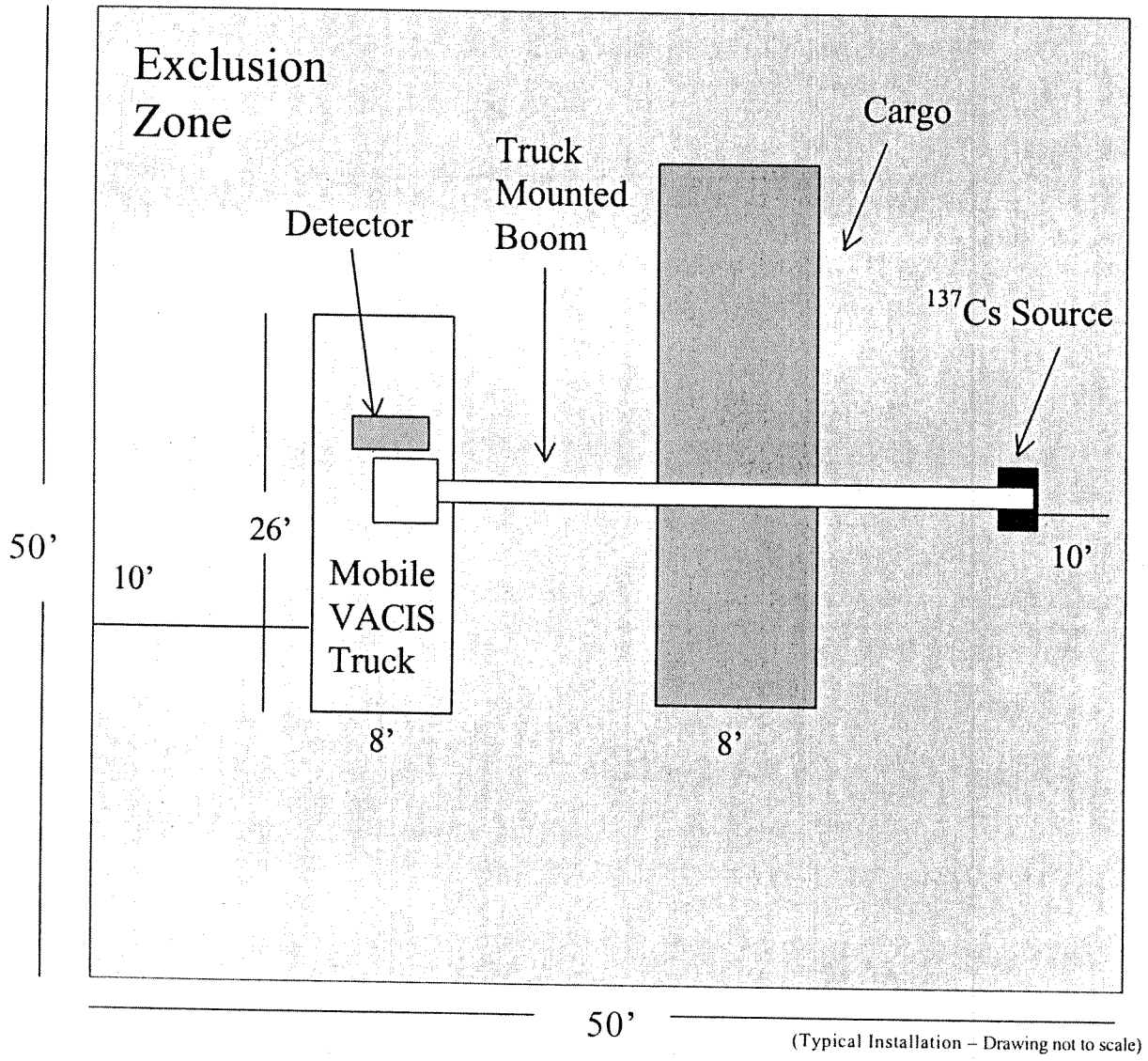


Figure 9. Mobile VACIS radiation safety exclusion zone.

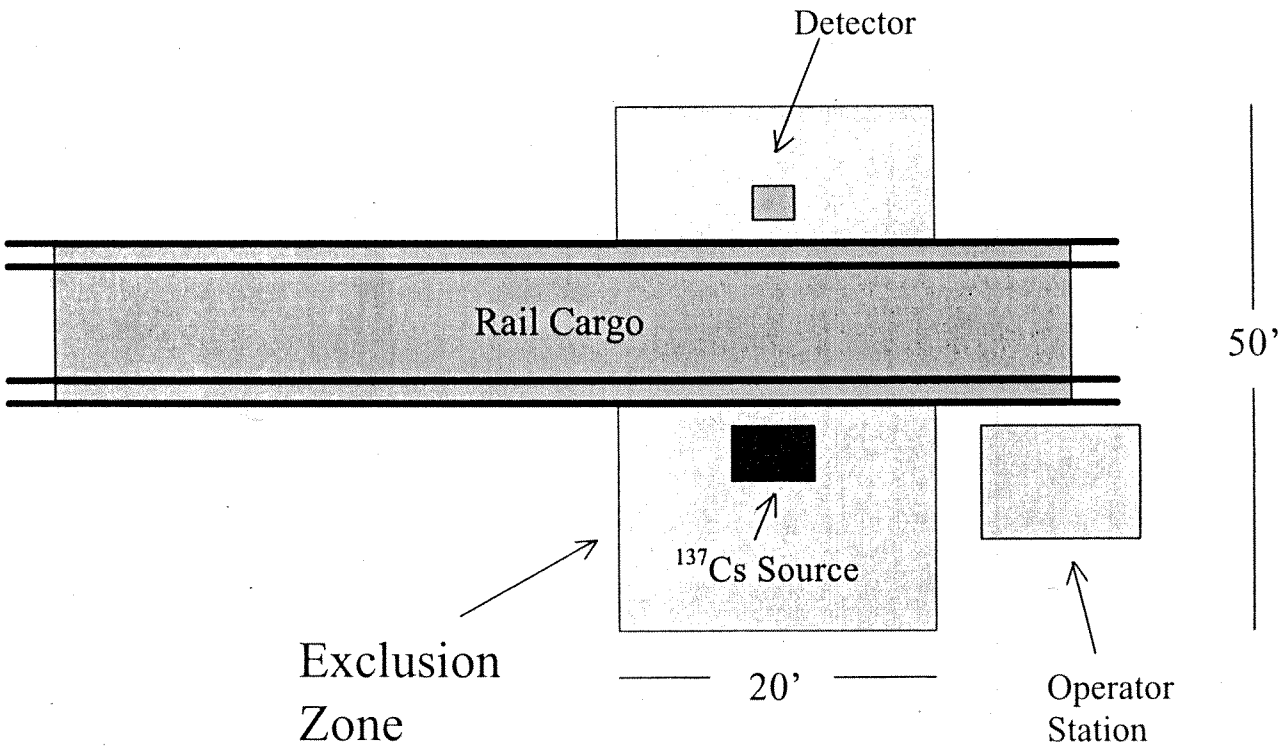


Figure 10. Rail VACIS radiation safety exclusion zone.

Assuming that a person was present in the cargo, they would receive the same radiation dose as the cargo. To reach the maximum allowable "per year" radiation dose, a person would have to be scanned 10,000 times per year (which equates to approximately 27 times per day, every day, for one year). Since the chance of this frequency of exposure is extremely remote, it is concluded that VACIS radiation will have not have a significant impact on persons located in scanned cargo.

6.14.2.6 Source Material Operations

6.14.2.6.1 Transportation

The VACIS ^{137}Cs radiation source has an effective operational life of 10 to 12 years,[27] and the estimated operational lifetime of each VACIS configuration (not considering refurbishment or upgrade) is also 10 to 12 years.[28] Hence, transportation of the radiation source material separate from the VACIS equipment may only be required during installation at each VACIS site and when each VACIS site is decommissioned. In this scenario, two truck shipments per VACIS installation would be expected on local and interstate highways at 10 to 12 year intervals. Since local roadways going to and from each expected VACIS site are currently heavily traveled by cargo and industrial traffic, two additional truck shipments over the 10 to 12 year timeframe are not expected to be noticeable in existing traffic. In all cases, the shipment of the source material will be in full and total compliance with US Department of Transportation regulations. Additionally, the source material will be transported within the Mobile VACIS equipment as it moves between sites. Though the movement of Mobile VACIS is expected to be conducted at variable intervals, these movements are not expected to have a significant impact on the heavy traffic presently experienced at ports of entry.

In all cases, the marking, packaging, and transportation of the source material in all VACIS configurations will be in full and total compliance with US Department of Transportation regulations 49 CFR Part 172.310 "Class 7 (radioactive) Materials, Marking"; 49 CFR Part 173.471, "Packaging"; and 10 CFR Part 71, "Packaging and Transportation of Radioactive Material".

6.14.2.6.2 Installation

VACIS II and Rail VACIS components will be shipped individually, and assembled at the location where the system is to be used. No radiation exposure to VACIS workers or to members of the public will result from either the shipment or assembly of the system because the radiation source will not yet have been installed in the system. Each ^{137}Cs source will each be shipped in a shielded cask to the VACIS site, and will be installed in the VACIS equipment by the vendor, SAIC.

Mobile VACIS will be shipped to its initial installation site as a unit with the ^{137}Cs source already installed by the vendor, SAIC.

6.14.2.6.3 Maintenance

USCS personnel will periodically perform limited maintenance on VACIS, such as lubricating the tracks on VACIS II and replacing small components such as light bulbs on all VACIS configurations. Whenever this maintenance is performed, the shutter on the ^{137}Cs source shielded container will be kept in the closed position.

Non-routine maintenance will be performed by the vendor, SAIC. Whenever major disassembly of the VACIS equipment is required, the ^{137}Cs source will be removed from the system and kept in a shielded storage cask.

6.14.2.6.4 Disposal

Each VACIS installation will generate radioactive waste in the form of either reusable or nonreusable ^{137}Cs radiation source material. The disposal of each form of radioactive waste is summarized below:

- Radiation source material not exceeding its useful life, in its sealed container, would be removed under health physics supervision and stored in a separate radiologically controlled location for future use or shipment. Packaging and off-site shipment of the radiation source material would follow US Department of Transportation (DOT) regulations.

- Radiation source material exceeding its useful life, in its sealed container, would be packaged according to DOT specifications and shipped by the radiation source manufacturer to an approved disposal site.

6.14.2.7 Effects of Accidents

Under accident conditions associated with handling, storage, and use of the ^{137}Cs source housing, it is unlikely that any person would receive an external radiation dose or dose commitment in excess of the dose to the appropriate organ as specified in the following chart:[29]

Part of Body	Dose
Whole body; head and trunk; active blood-forming organs; gonads; or lens of eye.	15 rem
Hands and forearms; feet and ankles; localized areas of skin averaged over areas no larger than 1 cm^2 (0.15 in^2).	200 rem
Other organs.	50 rem

The worst Design Basis Accident is the open shutter scenario and the inability to close the shutter on the ^{137}Cs source shielded container. The recommended response for this situation is described in the USCS document *Recommended Operating Procedures for the Vehicle and Cargo Inspection System (VACIS)* dated 15 February 2000, which is included as Appendix C herein.

6.14.2.8 Radiation Safety

VACIS II, Mobile VACIS, and Rail VACIS all incorporate redundant safety controls, such as emergency shutoff pushbutton controls at several locations on the VACIS equipment. Additionally, in the event of a power loss, each VACIS configuration has a safe shutoff mode in which the shutter on the ^{137}Cs source shielded container automatically closes.

The personnel assigned to operate VACIS will be specifically trained for safe gamma radiation system operations. Training for the VACIS operators will consist of lectures and courses in basic radiation physics, radiation safety, biological effects of radiation, instrumentation, radiation control, and operating procedures during normal and emergency conditions.

6.14.2.9 Licensing

The USCS currently holds an NRC Materials License for ^{137}Cs sealed sources (License number 08-17447-01, Amendment 15) issued on 5 January 2001 and due to expire on 31 August 2003. A copy of this license is included as Appendix D herein. The NRC requires that the USCS be in full and total compliance with the Materials License and all of the 30 conditions as delivered and specified in the license in addition to all statements, representations, and procedures in the license's application and correspondence as indicated on Page 8 of the license. Nuclear Regulation (NUREG)-1556, Volume 4, October 1998, entitled *Program-Specific Guidance About Fixed Gauge Licenses*, will then automatically become a condition of the USCS license.

Section 7
DECOMMISSIONING PLANNING

The NRC has established technical and financial regulations for decommissioning licensed nuclear facilities (53 CFR Part 24018, 27 June 1988). These regulations address decommissioning planning, needs, timing, funding methods, and environmental review requirements for public and private facilities having licenses under 10 CFR Parts 30, 40, 50, 70, and 72. The intent of the regulations is to ensure that the decommissioning of all licensed facilities will be accomplished in a safe and timely manner and that licensees will provide adequate funds to cover all costs associated with decommissioning.

The regulations specify that a facility licensee either must set aside money for decommissioning activities or must provide a guarantee, through a third party, that funds will be available. The funds set aside or guaranteed are determined by a Decommissioning Funding Plan (DFP), which the licensee provides. The requirements for financial assurance are specific to the types and quantities of byproduct material authorized on a license, and a licensee does not need to take any action to comply with the financial assurance requirements if the total inventory of licensed material does not exceed the thresholds specified in 10 CFR Parts 30.35(b) and 30.35(d). For ^{137}Cs, this threshold is 100,000 curies. Because the USCS inventory of ^{137}Cs does not exceed the 100,000 curie threshold, the financial assurance requirements do not apply to the VACIS program.

The NRC requires licensees to maintain, in an identified location, records important to facility decommissioning. These records include architectural drawings of structures and equipment where each radiation source was used or stored. In addition, if fixed radiation sources have experienced unusual occurrences (e.g., leaking radiation sources or other incidents that involve spread of contamination), records need to be maintained describing contamination that remains after cleanup or that may have spread to inaccessible areas. The USCS will maintain these records for each VACIS installation, in accordance with NRC requirements.

It is difficult to estimate the useful lifetime of a VACIS installation prior to any decommissioning because 1) the degree and duration of user demand for gamma imaging technology is unknown, and 2) all that may be needed to extend the operational life of the VACIS equipment is a replacement radiation source sealed container. Additionally, future development of gamma imaging technology may enable upgrades to be made to an existing VACIS installation, thereby extending its useful lifetime.

However, it remains worthwhile to consider decommissioning procedures that may be necessary for a VACIS installation approximately 10 to 12 years after first operation. Potential decommissioning procedures are summarized below:

- Components such as detector array towers, rails, and Mobile VACIS trucks would be removed to a temporary storage area for possible reuse at another VACIS installation.

- Radiation source material not exceeding its useful life, in its sealed container, would be removed under health physics supervision and stored in a separate radiologically controlled location for future use or shipment. Packaging and off-site shipment of the radiation source material would follow US Department of Transportation (DOT) regulations.

- Radiation source material exceeding its useful life, in its sealed container, would be packaged according to DOT specifications and shipped by the radiation source material manufacturer to an approved disposal site.

Because no parts of building structures or equipment are expected to be contaminated with radiation, they would be available for reuse. Hardware and equipment would be processed using standard USCS procedures for disposition of excess government-owned property.

Section 8
END NOTES

1. "FY00 Cocaine, Marijuana, & Heroin Seizure Stats"; USCS Website; http://www.customs.gov/enforcem/enforcem.htm

2. *Investment Review Board, High Technology Sub-Group – Imaging and Re-locatable Inspection System*; USCS; 29 January 1999; Page 8.

3. Telephone conversation with Michael Terpilak, Certified Health Physicist, 29 August 2000.

4. Written comment received from Michael Terpilak, Certified Health Physicist, 14 August 2000.

5. Telephone conversation with Richard Whitman, Radiation Safety Officer, USCS, 16 March 2001.

6. Written comment received from Michael Terpilak, Certified Health Physicist, 14 August 2000.

7. Written comment received from Michael Terpilak, Certified Health Physicist, 14 August 2000.

8. *National Drug Control Strategy, 2000 Annual Report, Counterdrug Research and Development Blueprint Update*; Office of National Drug Control Policy; Appendix B.

9. *Investment Review Board, High Technology Sub-Group – Imaging and Re-locatable Inspection System*; USCS; 29 January 1999; Page 2.

10. *National Drug Control Strategy, 2000 Annual Report, Counterdrug Research and Development Blueprint Update*; Office of National Drug Control Policy; Page 6.

11. *Customs Service: Drug Interdiction Efforts*; Briefing Report, GAO/GGD-96-189BR; 26 September 1996.

12. *Development and Acquisition Plan for Border Port Inspection Technology*; USCS, Applied Technology Division, Office of Information and Technology; April 1996; Page 2.

13. *Development and Acquisition Plan for Border Port Inspection Technology*; USCS, Applied Technology Division, Office of Information and Technology; April 1996; Page 5.

14. *Investment Review Board, High Technology Sub-Group – Imaging and Re-locatable Inspection System*; USCS; 29 January 1999; Page 2.

15. *Ten-Year Counterdrug Technology Plan and Development Roadmap*; Office of National Drug Control Policy; June 1998.

16. *Investment Review Board, High Technology Sub-Group – Imaging and Re-locatable Inspection System*; USCS; 29 January 1999; Page 2.

17. *Investment Review Board, High Technology Sub-Group – Imaging and Re-locatable Inspection System*; USCS; 29 January 1999; Page 7.

18. *Ten-Year Counterdrug Technology Plan and Development Roadmap*; Office of National Drug Control Policy; June 1998.

19. *CBDNet* Submission No. 306715; 9 March 1999; Gamma-Ray Inspection System, Sources Sought for commercial items.

20. Telephone conversation with Carolyn Whorton, Program Manager, USCS, 24 January 2001.

21. 29 CFR 1910.95, *Occupational Noise Exposure*

22. *Draft USCS ALARA Program* White Paper

23. *Recommended Operating Procedures for the Vehicle and Cargo Inspection System (VACIS)*; USCS; 15 February 2000; Page 4.

24. E-mail received from Dr. Siraj M. Khan, Certified Health Physicist, USCS; 23 January 2001.

25. *Radiation Safety Guidelines for Gamma-Ray Imaging Systems*; Dr. Siraj M. Khan, Certified Health Physicist, USCS; Page 9.

26. Written comments received from Michael Terpilak, Certified Health Physicist, 14 August 2000.

27. Written comment received from Michael Terpilak, Certified Health Physicist, 14 August 2000.

28. *Investment Review Board, High Technology Sub-Group – Imaging and Re-locatable Inspection System*; USCS; 29 January 1999; Page 8.

29. *Registry of Radioactive Sealed Sources and Devices; Safety Evaluation of Device; Model – VACIS II; No. CA0215D104G; 18 August 2000*; Page 14.

Section 9
PERSONS AND ORGANIZATIONS CONTACTED

The following individuals (shown in alphabetical order) were contacted during the development of the VACIS PEA:

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Section 10
ACRONYMS AND ABBREVIATIONS

'	Feet
^{137}Cs	Cesium-137
A	Amperes
ACHP	Advisory Council on Historic Preservation
ALARA	As Low As is Reasonably Achievable
APE	Area of Potential Effect
AQMD	Air Quality Management District
AZ	Arizona
B	Billion
BFE	Base Flood Elevation
BMP	Best Management Practice
CA	California
CAA	Clean Air Act
CAAA	Clean Air Act Amendment
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm^2	Square centimeter
CO	Carbon monoxide
CTAC	Counterdrug Technology Assessment Center
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dBA	Audio decibel
degC	Degrees Celsius
degF	Degrees Fahrenheit
DFP	Decommissioning Funding Plan
DNL	Day-Night Average Sound Level
DOT	US Department of Transportation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
FHBM	Flood Hazard Boundary Map
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FL	Florida
FONSI	Finding Of No Significant Impact
FR	Federal Register
FY	Fiscal year
g/hr	Grams per hour
g/min	Grams per minute
GA	Georgia
GVW	Gross vehicle weight
HDD	Heavy-duty diesel
HDDV	Heavy-duty diesel vehicle
HDGV	Heavy-duty gasoline-fueled vehicle

Hz	Hertz
in^2	Square inch
LA	Louisiana
lb	Pounds
LDDT	Light-duty diesel truck
LDDV	Light-duty diesel vehicle
LDGT	Light-duty gasoline-fueled truck
LDGV	Light-duty gasoline-fueled vehicle
M	Million
MC	Motorcycle
mg/m^3	Milligram per cubic meter
MI	Michigan
mph	Miles per hour
mrad	Millirad
mrem	Millirem
NAA	Nonattainment area
NAAQS	National Ambient Air Quality Standards
NCA	Noise Control Act of 1972
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act of 1966
NII	Non-Intrusive Inspection
NJ	New Jersey
NM	New Mexico
NMFS	National Marine Fisheries Service
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NPDES	National Pollution Discharge Elimination System
NRC	Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NSR	New Source Review
NUREG	Nuclear Regulation
NY	New York
O_3	Ozone
ONDCP	Office of National Drug Control Policy
OSHA	Occupational Safety and Health Administration
Pb	Lead
PEA	Programmatic Environmental Assessment
$PM_{2.5}$	Particulate matter less than 2.5 micrometers in diameter
PM_{10}	Particulate matter less than 10 micrometers in diameter
ppm	Parts per million
PR	Puerto Rico
psi	Pounds per square inch
rad	Radiation absorbed dose
rem	Roentgen equivalent man
ROG	Reactive Organic Gas
RVP	Reid vapor pressure
RWQCB	Regional Water Quality Control Board
SAIC	Science Applications International Corporation
SC	South Carolina

SEA	Supplemental Environmental Assessment
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO_2	Sulfur dioxide
SWRCB	State Water Resources Control Board
TMEC	Thunder Mountain Evaluation Center
TX	Texas
$\mu g/m^3$	Microgram per cubic meter
µrad	Microrad
µrem	Microrem
US	United States
USACE	US Army Corps of Engineers
USC	United States Code
USCS	US Customs Service
USFWS	US Fish and Wildlife Service
VA	Virginia
VAC	Volts alternating current
VACIS	Vehicle and Cargo Inspection System
VOC	Volatile organic compounds
yr	Year

Section 11
LIST OF PREPARERS

The following individuals (shown in alphabetical order) prepared the VACIS PEA:

David Houde – Mr. Houde is a Senior Engineer with Veridian Corporation. He has a Bachelor of Science degree in Electrical Engineering.

Scott Matthews – Mr. Matthews is an Environmental Analyst, with a Bachelor of Science degree in Public Affairs / Environmental Science and Management.

Tania McDonald – Ms. McDonald is an Environmental Analyst with Veridian Corporation. She has a Bachelor of Science degree in Environmental Science & Management, and a Master of Science degree in Environmental Management.

Thomas "Chico" Nelson – Mr. Nelson is an Environmental Analyst with Veridian Corporation.

David Walls – Mr. Walls is a Program Manager with Veridian Corporation. He has a Master of Science degree in Environmental Management.

APPENDIX A

Registry of Radioactive Sealed Sources and Devices; Safety Evaluation of Device; Model – VACIS II; No. CA0215D104G; Date – 18 August 2000

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: CA0215D104G DATE: August 18, 2000

DEVICE TYPE: Gauge to detect contraband in trucks, busses, and passenger vehicles

MODELS: VACIS II

MANUFACTURER/ DISTRIBUTOR: Science Applications International, Inc.
16701 West Bernardo Drive
San Diego, CA 92127

SEALED SOURCE MODEL DESIGNATION: Minnesota Mining and Manufacturing Co. (4F6S)
Monsanto Research Company (24148)
Amersham Corporation (CDC.700 and CDC.711m)

ISOTOPE:	MAXIMUM ACTIVITY:
Cs-137	1.0 Ci (37.0 GBq)

LEAK TEST FREQUENCY: 12 Months

PRINCIPAL USE: (D) Gamma Gauge

CUSTOM DEVICE: _____ YES __X__ NO

DEVICE TYPE: Gauge to detect contraband in trucks, busses, and passenger vehicles

DESCRIPTION:

Overview The VACIS II device is designed to detect contraband in busses and passenger vehicles as well as contraband or stolen automobiles in the cargo containers of commercial trucks. A fan beam of Cs-137 ($T_{1/2}$ = 30.2 years, β^- decay, 662 keV γ) gamma rays is used to measure density within the bus, passenger vehicle, or cargo container. Software is used to generate a map of measured density, which a system operator views to identify contraband or stolen automobiles.

The general features and layout of these devices are shown in Attachment 1. An Ohmart SH-F2 or SH-F3 gauge containing a Cs-137 source with a maximum activity of 1.0 Ci, and a Science Applications International, Inc. (SAIC) secondary shutter/fan collimator are housed in the source environmental enclosure. Either shutter effectively turns the beam OFF. During operation, the gauge shutter is opened and left open, and SAIC's secondary shutter is cycled. Opening SAIC's secondary shutter produces a fan beam of gamma rays directed at the detector tower. The detector tower is 21 feet high and contains an array of approximately 336 NaI detectors, depending upon customer requirements. Measured count rates are dependent upon the density of material within the passenger vehicle or cargo container.

The bus, passenger vehicle, or commercial truck is driven into position between the source environmental enclosure and the detector tower. The driver then exits the vehicle and is escorted to an area outside an exclusion area that is established around the source and detector tower. The system operator asks the driver if there are any persons or animals in the passenger vehicle or cargo container. If persons or animals are present, the vehicle or cargo container is not scanned. The system operator ensures that there are no persons in the exclusion area, and then opens the SAIC secondary collimator to initiate the scan. The source and detector tower move together along the length of the bus, passenger vehicle, or commercial truck. A track and trolley system is used to synchronously move the source and detector tower along the bus, passenger vehicle, or commercial truck. The SAIC secondary shutter closes automatically when the source or detector tower reaches the end of their pre-selected scan distance. The shutter would also close in the event that the source or detector tower reaches the end of the track. The system operator may also manually close the shutter. Details of each system component follow.

Source assembly The source assembly, shown in Attachment 2, consists of an Ohmart SH-F2 or SH-F3 gauge and a SAIC shutter/collimator. The Ohmart gauge is described in

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Sealed Source and Device Registration OH522D102B, which supersedes KY512D101B. The source housing assembly of the Ohmart gauge is not altered in this application. Engineering drawings of the SH-F2 and SH-F3 source housing assemblies are shown in Attachments 3 and 4, respectively. The VACIS II device uses the 0-45 degree collimator (SH-F2) or 0-60 degree collimator (SH-F3). The ANSI N538-1979 classification of these gauges is ANSI 34-454-454-R2. Sources used in the gauge have an ANSI N542-1977 classification of C43344 or higher, which exceeds the performance requirement of C43232 for gamma gauges that have the source protected inside the device. The gauge shutter is operated from a control box located in the operator station. For the SH-F2 gauge, the shutter is motor driven and electric power is needed to both open and close the shutter. A trickle-charged battery is used to ensure that the gauge shutter may be closed even with loss of grid power. For the SH-F3 gauge, the shutter is motor driven and electric power is needed to open the shutter; however, the shutter is a fail-safe design. A torsion spring closes the shutter upon loss of electric power. The trickle-charged battery is not needed with the SH-F3 gauge. Both gauges are designed so that a padlock may be used to secure the source in the OFF position.

SAIC has added a shutter/collimator assembly to produce a fan beam and provide additional shielding. An engineering drawing of the SAIC shutter/collimator assembly is shown in Attachment 5. This assembly is securely mounted to the Ohmart gauge using brackets. The shutter/collimator is a 4.0" OD x 1/8" wall aluminum tube that contains lead inserts. The shutter is opened when the system operator initiates a scan using a computer located in the operator station. The SAIC secondary shutter closes automatically when the source or detector tower reaches the end of the pre-selected scan distance. As a backup safety feature, the shutter would also close when the source or detector tower reaches the end of the track. An electric motor rotates the shutter to the ON position by means of a drive belt. A torsion spring rotates the shutter to the OFF position when power is removed from the motor. In the ON position, the Cs-137 beam from the Ohmart gauge is collimated to a fan beam with a divergence of approximately 5 degrees. In the OFF position, the beam is blocked with 2 3/4" of lead. The SAIC shutter/collimator is a fail-safe design. The torsion spring returns the shutter to the OFF position upon loss of grid power.

The source and shutter assemblies are kept dry and protected from harsh weather by an environmental enclosure. The source enclosure is 24" wide, 90" deep, and 48" tall. The source is positioned 12" from the back wall. A motor and lifting mechanism are used to raise and lower the gauge within the enclosure. The height of the gauge is set dependent upon the type of vehicle being scanned. The enclosure is made of 0.090" stainless steel

or aluminum plates, and has a weatherproofed access panel. The Ohmart gauge and SAIC's secondary shutter/collimator assemblies are bolted to the environmental enclosure. The source enclosure is mounted to the trolley assembly. The access panel is always locked to prevent unauthorized entry. Only SAIC, other specific licensee, or trained operator may access the interior of the source environmental enclosure. The trained operator may access the source enclosure only to lock and unlock the shutter to the gauge. These security features, as well as product labeling, preclude accidental exposure or tampering with the radioactive source. A label on the source enclosure states that the source enclosure or track assembly may not be moved, except by SAIC or authorized specific licensee.

The beam ON status is shown by a prominently visible flashing red light indicator and an audible alarm. The light and audible alarm are mounted on top of the source environmental enclosure. Only one shutter needs to be closed to turn the beam OFF. The flashing red light is ON whenever the secondary shutter is not fully closed. In particular, the flashing red light is ON when both shutters are open. Shutter ON and OFF positions are determined from a control signal to the Ohmart gauge and a microswitch position (or optical sensor indication) on the SAIC shutter. Legible signs, one at the source environmental enclosure and one at the entry to the inspection station, shall describe the meanings of the light indicators and audible alarm. For the sign at the entry to the inspection station, a directive to STOP is made when the flashing red light indicator is ON or the audible alarm is ON. These signs shall be clearly legible at a distance of 40 m, day or night, and under reasonable weather conditions.

Detector tower: The tower houses an array of approximately 336 NaI detectors (other types of detectors may also be used), with three detectors to a row. Crystal size is nominally 1.5" in diameter and 2.5" long. The detector array is enclosed within a weatherproofed environmental housing made of 0.090" aluminum or stainless steel plate. A prominently visible flashing red light indicator is mounted on the environmental enclosure or its base to indicate that the beam is ON. Legible signs mounted on the detector tower shall describe the meanings of the light indicator and audible alarm. The detector tower is mounted to the trolley assembly.

Operator station and shutter control box The operator station may be a permanent structure, semi-permanent structure. or mobile van. The operator is responsible for the safe operation of the system, including opening and closing the beam.

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The shutter control box is shown in Attachment 6. Green and red lighted pushbuttons are used to enable and disable the primary shutter. Green and red lighted pushbuttons are used to open and close the primary shutter as well as indicate shutter ON/OFF status. A green light indicates that the shutter is closed, based upon the position of a microswitch; a red light indicates any other condition of the shutter. The primary shutter may be opened only when it is enabled. For the secondary shutter, green and red lights are used to indicate shutter ON/OFF status. No pushbuttons are available to open or close the secondary shutter from the control box. Instead, the secondary shutter is cycled automatically through a computer software interface that is used during scanning operations. The secondary shutter may also be closed by an operator by clicking an icon on the computer monitor. In addition, both shutters may be closed immediately by pressing the emergency stop button on the control box. A lock-and-key control on the control box ensures that the gauge shutter cannot be opened without the key. Turning the key to the OFF position or removing the key will automatically close the gauge shutter.

When starting the system, the primary shutter, secondary shutter, and shutter disable green lights are ON. The primary shutter is then enabled. The gauge shutter is then opened and left open. The beam is then turned ON and OFF with the secondary shutter. When shutting the system down, the operator closes the gauge shutter (the secondary shutter is normally closed), and the computer system is turned off. As a backup safety feature, the system is designed such that both shutters would close when the computer system is turned off.

The computer imaging system is also located within the operator station. A density map of the bus, passenger vehicle, or commercial truck is constructed in real time and displayed on a monitor. The density map is stored and reviewed by the system operator.

System layout The layout of the system is shown in Attachment 1. The track and trolley assembly for the source is shown clearly. A similar track and trolley assembly is used for the detector tower, but is occluded in the Attachment 1 view by the rendition of the physical barrier that defines the exclusion area. The barrier may be either a chain fence or K-rail (Jersey barrier). Traffic lights, signs, or other traffic control features are used such that vehicles may be safely driven into position within the exclusion area. There are gates at the entrance and exit to the exclusion area. The exclusion area is defined by the barrier and the two gates. The length of each barrier is approximately 110 feet, and the barriers are approximately 65 feet apart. Each track is 90 feet long. Source to detector distance is 30 feet. Clearance between the side of vehicle and the source environmental enclosure is at least 2 feet; this clearance should preclude the possibility of a vehicle

accidentally striking the source enclosure. In addition, Pilasters are positioned at the ends of each track to preclude a vehicle from striking the track when entering or exiting the exclusion area.

The operator station is located outside the exclusion area. The station may be located at the entrance to the exclusion area (as shown in Attachment 1) or more towards the source or detector sides of the exclusion area. Before opening the beam, the operator checks to ensure that no persons are in the exclusion area. The operator's view of the area is partially blocked by the vehicle. A video camera is installed so the operator can view this area on a monitor located within the operator station.

System operation Details on the operation of the VACIS II device are provided in the Operator's Manual. Operator training is provided by SAIC or authorized representative. The basic operating steps are: (1) At the start of a shift, the shutter on the Ohmart gauge is unlocked and the computer system is turned on. A key is needed to operate the Ohmart shutter from the control box. (2) Operator tests the two shutters and the indicating lights using the procedure described in the Operator's Manual. (3) Ohmart shutter is opened and kept opened throughout a shift. (4) Traffic control personnel direct the driver of a vehicle to drive into the exclusion area and park the vehicle. (5) System operator escorts the driver outside the exclusion area and asks the driver if there are any persons or animals in the vehicle. If so, the vehicle is not scanned. (6) System operator verifies that there are no persons within the exclusion area. (7) System operator starts the scan from the computer. This opens the beam and initiates the synchronous movement of the source and detector tower along the length of the vehicle. The beam may also be opened manually. The SAIC secondary shutter closes automatically after the vehicle has been scanned. (8) Density map is stored. System operator inspects density map to identify any contraband, potential contraband storage locations, or stolen automobiles. (9) After the audible alarm has stopped sounding and the red indicator lights have stopped flashing, indicating that the secondary shutter is closed, the driver is escorted back to the vehicle. The driver is then directed to drive out of the exclusion area. (10) Steps 4 through 9 are repeated for each vehicle undergoing a density measurement. (11) At the end of a shift, both shutters are closed and the computer system is turned off. The key is removed from the control box. The shutter on the Ohmart gauge is padlocked.

LABELING:

Labeling of the Ohmart SH-F2 and SH-F3 gauges is described in Sealed Source and Device Registration OH522D102B, which supersedes KY512D101B. When these

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gauges are used in the VACIS II device, the gauge's general license label and ON condition warning label are not used.

Labels on the control box are shown in Attachment 6. Labels on the source environmental enclosure are shown in Attachment 7. Labels on the physical barrier, detector tower, and operator station are shown in Attachment 8. The device is labeled in accordance with 10 CFR 32.51 and ANSI N538-1979. The control box has the following additional label: "DO NOT INTENTIONALLY EXPOSE PERSONS OR ANIMALS TO RADIATION BEAM." Only SAIC or authorized specific licensee may move the physical barrier, track and trolley assemblies, or the operator station.

Each label shall bear the statement, "Removal of this label is prohibited." The labels are made of 28-gauge, type 304 stainless steel with a yellow background and black lettering etched or stamped 0.003" deep. Labels and lettering are sized appropriately, and are permanently attached by rivets or screws to the device.

DIAGRAMS:

There are nine (9) attachments.

Attachment 1: Layout of VACIS II system.
Attachment 2: Ohmart SH-F2 gauge with attached SAIC shutter/collimator assembly.
Attachment 3: Source housing assembly of the Ohmart SH-F2 gauge.
Attachment 4: Source housing assembly of the Ohmart SH-F3 gauge.
Attachment 5: Engineering drawing of SAIC shutter/collimator assembly.
Attachment 6: Shutter control box.
Attachment 7: Labels on source environmental enclosure.
Attachment 8: Labels on physical barrier, detector tower, and operator station.
Attachment 9: Exposure rates with beam ON (30 foot source-to-detector installation with a 1.0 Ci Cs-137 source).

CONDITIONS OF NORMAL USE:

The VACIS II device is designed to detect contraband in busses and passenger vehicles as well as contraband or stolen automobiles in the cargo containers of commercial trucks. The device will be subjected to outdoor environments. The Cs-137 source and shutter assembly are kept dry and otherwise protected from harsh weather by an enclosed

environmental housing. The detector array is also enclosed within an environmental housing.

The VACIS II device uses an Ohmart Inc. Model SH-F2 or SH-F3 gauge. These gauges have been designed for the following environments:

Temperature	-40C to 60C (-40F to 140F); electrical shutter
Pressure	Atmospheric
Vibration	Ranges from zero to mild
Corrosion	Ranges from zero to highly corrosive vapors
Impact	Accident conditions only
Fire	Unlikely
Explosion	Unlikely

These environments meet or exceed those in which the VACIS II device is used.

The access door on the source environmental enclosure, which surrounds the source, shall be kept locked at all times except during authorized access by a specific licensee. A trained operator may access the source environmental enclosure for the purpose of locking or unlocking the shutter to the gauge.

SAIC reports that the working life of the VACIS II device is 30 years, unrelated to the decay of the Cs-137. SAIC, however, recommends that the source be exchanged every 15 years due to decay of the Cs-137.

PROTOTYPE TESTING:

Credit for prototype testing of the VACIS II device is provided by the prototype testing documented for the Ohmart Inc. Model SH-Fx series gauges. The ANSI N538-1979 classification of the SH-F2 and SH-F3 gauges is ANSI 34-454-454-R2. The SH-Fx series gauge passed all tests for Type A packaging, including water spray, 30 foot drop, compression, and penetration tests. The similar Model SH-F1 gauge passed the following environmental performance tests:

Temperature	800C (1472F) for 30 minutes.
Vibration	0-50 cps at amplitude 0-1/16" for 16 hours.
OFF/ON Mechanism	Operated several hundred cycles.
Impact	Several hundred blows with a 1/2 pound hammer.

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SAIC has prototype tested the VACIS II device. The spring on the SAIC shutter was redesigned to improve the fatigue limit. SAIC reported that more than 100,000 scanning operations have been performed with the VACIS II device without a single radiation safety occurrence.

The sealed sources used in the Ohmart Model SH-F2 and SH-F3 gauges have achieved the following ANSI N542-1977 classifications:

Manufacturer	Model	ANSI N542 - 1977 Classification
Minnesota Mining and Manufacturing Co.	Model 4F6S	C66546
Monsanto Research Company	Model 24148	C43344
Amersham Corporation	Model CDC.700	C66445
Amersham Corporation	Model CDC.711m	C66646

EXTERNAL RADIATION LEVELS:

SAIC provided exposure rates around the source environmental enclosure, along the beam path between the source and detector array, and at the operator station. Measured exposure rates around the source environmental enclosure are provided in Table 1 below. Measured exposure rates are for a 1.0 Ci Cs-137 source, an environmental enclosure that is 24" wide, 90" deep, and 48" tall, with the source positioned 12" from the back wall, and with various amounts of lead lining the interior walls of the left side, right side, and back faces of the enclosure. Exposure rates provided for the window side, shutter condition 3, were calculated using the inverse square law from a measured exposure rate at 15 feet. Exposure rates measured around the VACIS II source enclosure shall not exceed the values presented in Table 1. Pursuant to the definition provided in 10 CFR 20.1003, a high radiation area is not produced by this device.

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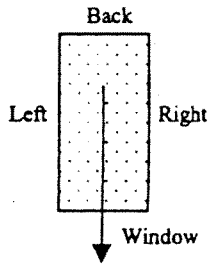
Table 1. Measured exposure rates around enclosure containing a 1.0 Ci Cs-137 source.

Distance		Window side		Left/right side		Back side		Top side		Bottom side	
(in)	(cm)	(mR/hr)	(μSv/hr)	(mR/hr)	(μSv/hr)	(mR/hr)	(μSv/hr)	(mR/hr)	(μSv/hr)	(mR/hr)	(μSv/hr)
2.0	5	1) 0.01	0.1	<2.0	<20.	0.98	9.8	0.4	4	0.06	0.6
		2) 0.03	0.3	<2.0	<20.	0.98	9.8	0.4	4	0.06	0.6
		3) 80	800	<2.0	<20.	0.98	9.8	0.4	4	0.06	0.6
11.8	30	1) 0.01	0.1	0.6	6.0	0.34	3.4	0.21	2.1	0.03	0.3
		2) 0.01	0.1	0.6	6.0	0.34	3.4	0.21	2.1	0.03	0.3
		3) 60	600	0.6	6.0	0.34	3.4	0.21	2.1	0.03	0.3
39.4	100	1) 0.01	0.1	0.12	1.2	0.07	0.7	0.07	0.7	0.01	0.1
		2) 0.01	0.1	0.12	1.2	0.07	0.7	0.07	0.7	0.01	0.1
		3) 38	380	0.12	1.2	0.07	0.7	0.07	0.7	0.01	0.1

Note: Measured exposure rates are reported for three different shutter conditions:
1) Ohmart gauge shutter closed and SAIC shutter closed.
2) Ohmart gauge shutter open and SAIC shutter closed.
3) Ohmart gauge shutter open and SAIC shutter open.



Values reported in Table 1 are the maximum exposure rates measured along each face of the environmental enclosure. Interior walls of the left side, right side, and back faces are lined with a sufficient amount of lead, lead shot, or other shielding material to reduce the exposure rates to less than those shown in the table.

When the device is not in operation (both shutters closed), the dose to a person standing next to the source environmental enclosure does not exceed 2 mrem in any one hour.

Exposure rates in the beam are shown in Attachment 9. A radiation area, as defined in 10 CFR 20.1003 (dose equivalent in excess of 5 mrem in 1 hour at 30 cm), is produced from the beam exit to the detector tower. This area shall be conspicuously posted with signs bearing the radiation symbol and the words "CAUTION, RADIATION AREA," pursuant to 10 CFR 20.1902. These signs also bear the words "RADIATION BEAM PRESENT WHEN RED INDICATOR IS ON." Posting procedures and requirements are described in the Operator's Manual. This area does not need to be posted when the device is not in operation. Radiation area signs with the additional wording that a radiation area is present when the red indicator lights are flashing may be posted permanently; that is, even when the device is not in operation.

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SAIC calculated the radiation dose that would be received by a person who unknowingly was in a vehicle during a scan. SAIC reported that the person would receive a deep-dose equivalent of 5 μrem, based upon dose measurements.

When the beam is ON, the exposure rate inside the operator's station does not increase by more than 10 μR/hr above background. SAIC reports that the total dose effective equivalent received by an operator is less than 25 mrem in a year.

QUALITY ASSURANCE AND CONTROL:

Underwriters Laboratories Inc. has certified that SAIC Technology Integration and Products Group is in compliance with ISO 9001:1994. The scope of the registration is for measuring and controlling devices, not elsewhere classified. SAIC maintains a quality assurance and control program that has been deemed acceptable for licensing purposes by the California Department of Health Services. A copy of the program is on file with the California Department of Health Services.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- The VACIS II device is designed to detect contraband in busses and passenger vehicles as well as contraband or stolen automobiles in the cargo containers of commercial trucks. No other use is authorized.

- The device shall be distributed to persons generally licensed by the NRC, an Agreement State, or a Licensing State.

- Handling, storage, use, transfer, and disposal: As required by 10 CFR 31.5 or Agreement State equivalent.

- The device shall be leak tested prior to initial use and at intervals not to exceed 12 months using techniques capable of detecting 0.005 microcurie (185 Bq) of removable contamination. The device shall be leak tested only by a person holding a specific license pursuant to 10 CFR 30 and 10 CFR 32 or from an Agreement State or Licensing State to perform such activities. Leak test results shall be provided to the generally licensed user.

- Only SAIC or authorized specific licensee may perform the following: installation, relocation, moving any component of the device, maintenance, repair, source

installation or exchange, leak testing, and radiation surveying. A report on the radiation survey shall be provided to the generally licensed user.

- The generally licensed user is not authorized to perform any maintenance inside the source environmental enclosure. The generally licensed user is authorized to perform maintenance on the detectors and detector tower, and to test the two shutters and their indicator lights and audible alarm using procedures described in the Operator's Manual. The two shutters and their indicator lights and audible alarm shall be tested at the start of every operating shift.

- SAIC or authorized specific licensee shall perform an annual inspection of each system. The annual inspection shall include an inspection of the gauge and shutters and other parts of the device that are important to safe operation. The annual inspection shall also include a review of how the device has been operated and an observation of current operations to ensure that the device is being operated safely and in a manner consistent with ALARA. A report on the annual inspection shall be supplied to the generally licensed user.

- The layout of the devices, particularly the locations of the source and detector tower, shall be consistent with ALARA.

- For sites with multiple VACIS II devices in operation, exposure rates at one device may be affected by a beam ON condition at another device. Traffic flow and timing of the beam ON conditions shall be consistent with ALARA. The layout of the devices shall also be consistent with ALARA.

- The source environmental enclosure shall be locked at all times. Trained operators are authorized to access the source environmental enclosure for the purpose of locking and unlocking the shutter to the gauge. Otherwise, only SAIC or specific licensee are authorized to access the source environmental enclosure.

- The area from the beam exit to the detector tower shall be conspicuously posted with signs bearing the radiation symbol and the words "CAUTION, RADIATION AREA. RADIATION BEAM PRESENT WHEN RED INDICATOR LIGHT IS ON. NO ENTRY INTO THIS AREA IS PERMITTED WHEN RED INDICATOR IS ILLUMINATED." The area shall be posted using procedures described in the Operator's Manual. This area does not need to be posted when the device is not in operation.

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- The video camera shall be operational while density measurements are being made.

- Pursuant to 10 CFR 20.1301, the VACIS II device shall be installed such that the total effective dose equivalent to individual members of the public does not exceed 100 mrem in a year and such that a restricted area is established in areas where an individual may receive a dose greater than 2 mrem in any one hour.

- Pursuant to 10 CFR 20.1902, SAIC or authorized specific licensee shall post the source environmental enclosure with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL."

- Reviewer's Note: The following additional safety features and conditions of use provide reasonable assurance that the VACIS II device can be safely operated by persons not having training in radiological protection.

  Shutters are operated remotely. SAIC shutter closes automatically after a scan. Access panel on the source environmental enclosure is kept locked to prevent unauthorized access to the Ohmart gauge.

  SAIC or authorized specific representative will provide operator training in the form of a one week course offered at the customer's site. Training shall include procedures to be followed if the shutters fail to close or if the source environmental enclosure is damaged.

  SAIC or authorized specific licensee will perform a comprehensive radiation survey during each installation. A copy of the survey report shall be provided to the general licensee.

  System layout is such that it is unlikely that a vehicle would accidentally strike the source enclosure.

  System operator ensures that no persons are in the exclusion area while the beam is ON.

- This registration sheet and the information contained within the references shall not be changed without the written consent of the California Department of Health Services.

DEVICE TYPE: Gauge to detect contraband in trucks, busses, and passenger vehicles

SAFETY ANALYSIS SUMMARY:

The distributor has submitted sufficient information to provide reasonable assurance that:

- The device can be safely operated by persons not having training in radiological protection.
- Under ordinary conditions of handling, storage, and use of the device, the byproduct material contained in the device will not be released or inadvertently removed from the source housing, and it is unlikely that any person will receive in any period of one year a dose in excess of 10 percent of the limits specified in 10 CFR 20.1201(a).
- Under accident conditions associated with handling, storage, and use of the source housing, it is unlikely that any person would receive an external radiation dose or dose commitment in excess of the dose to the appropriate organ as specified in the following chart:

PART OF BODY	DOSE
Whole body; head and trunk; active blood-forming organs; gonads; or lens of eye.	15 rem (0.15 Sv)
Hands and forearms; feet and ankles; localized areas of skin averaged over areas no larger than 1 cm^2 (0.15 in^2).	200 rem (2.0 Sv)
Other organs.	50 rem (0.50 Sv)

Based upon review of the VACIS II device, and the information and test data cited below, we conclude that the device is acceptable for licensing purposes.

Furthermore, we conclude that the device would be expected to maintain its containment integrity for normal conditions of use and accidental conditions that might occur during uses specified in this certificate.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: CA0215D104G DATE: August 18, 2000

DEVICE TYPE: Gauge to detect contraband in trucks, busses, and passenger vehicles

REFERENCES:

The following supporting documents for the VACIS II device are hereby incorporated by reference and are made a part of this registry document.

- SAIC's application dated December 10, 1999, with enclosures thereto.
- SAIC's letters dated July 24, 2000, July 28, 2000, July 31, 2000, and August 17, 2000, with enclosures thereto.
- SAIC's electronic mails dated December 21, 1999, June 12, 2000, and July 27, 2000 (four on this date).
- SAIC's facsimiles dated April 27, 2000 and July 31, 2000.

ISSUING AGENCY:

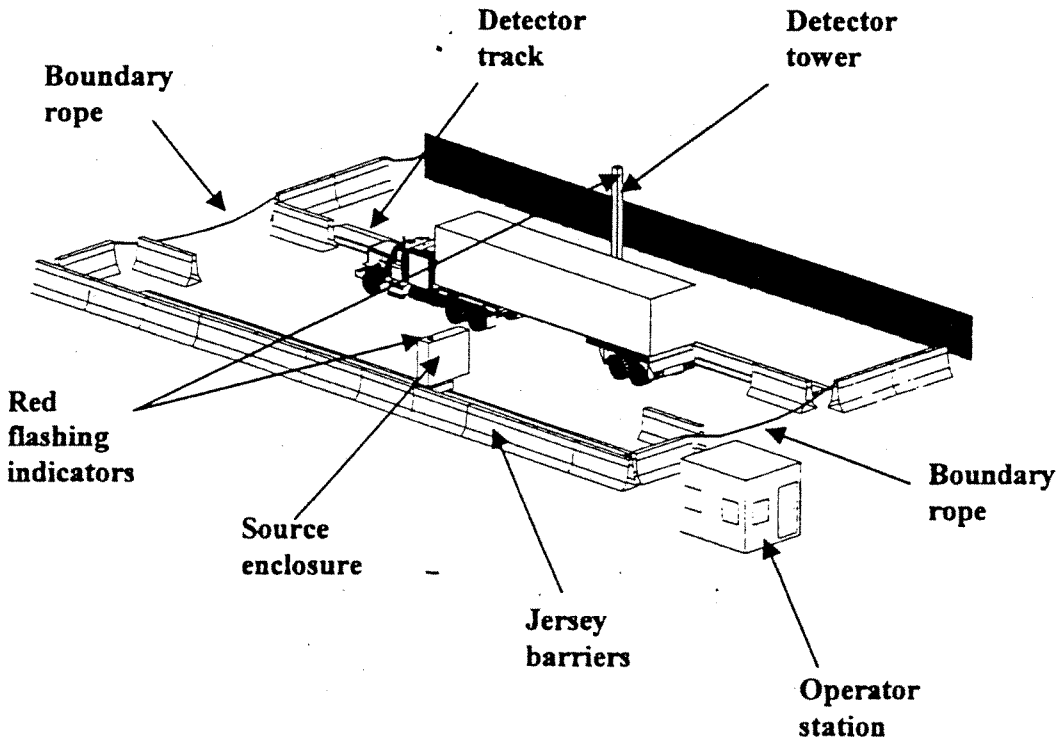
California Department of Health Services

Date: August 18, 2000 Reviewer: _____
Ronald Rogus, Ph.D.

Date: August 18, 2000 Concurrence: _____
David Wesley, M.S.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

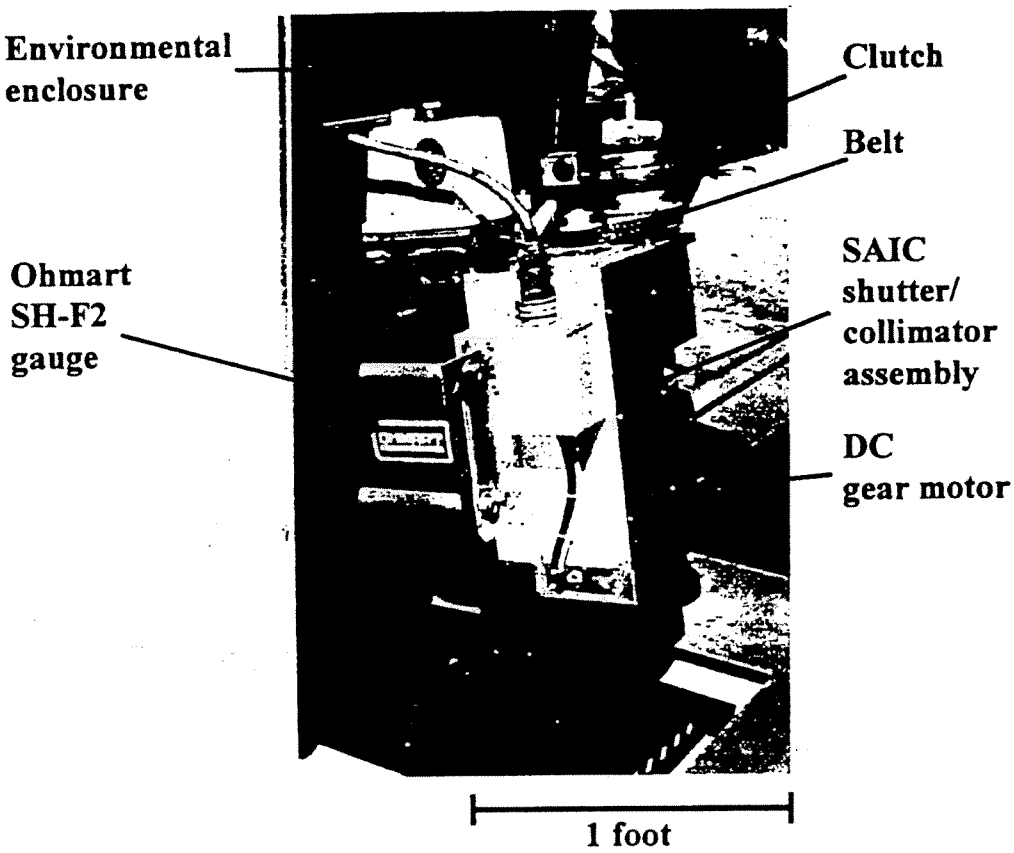
NO.: CA0215D104G DATE: August 18, 2000 ATTACHMENT 1



Layout of VACIS II system

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: CA0215D104G DATE: August 18, 2000 ATTACHMENT 2

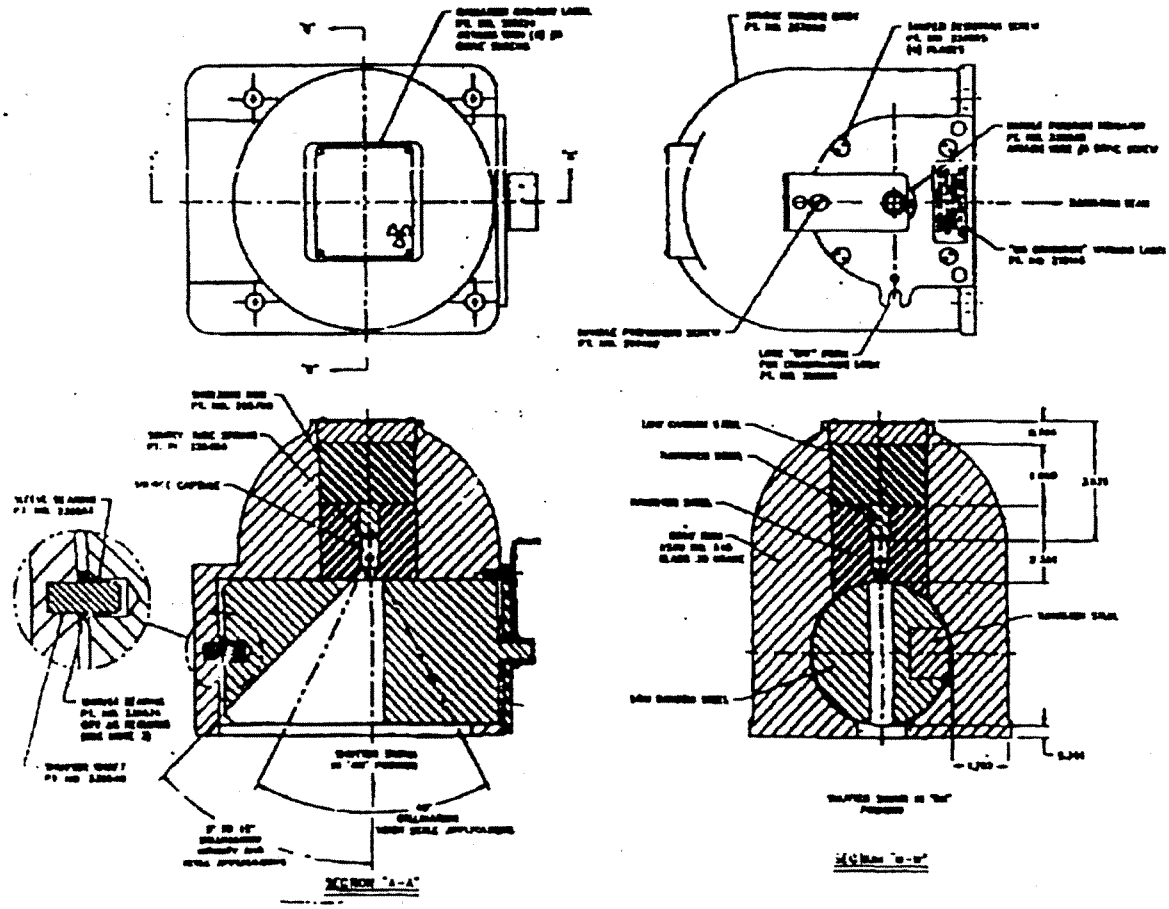


Note: Ohmart SH-F3 gauge similar.

Ohmart SH-F2 gauge with attached SAIC shutter/collimator assembly

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

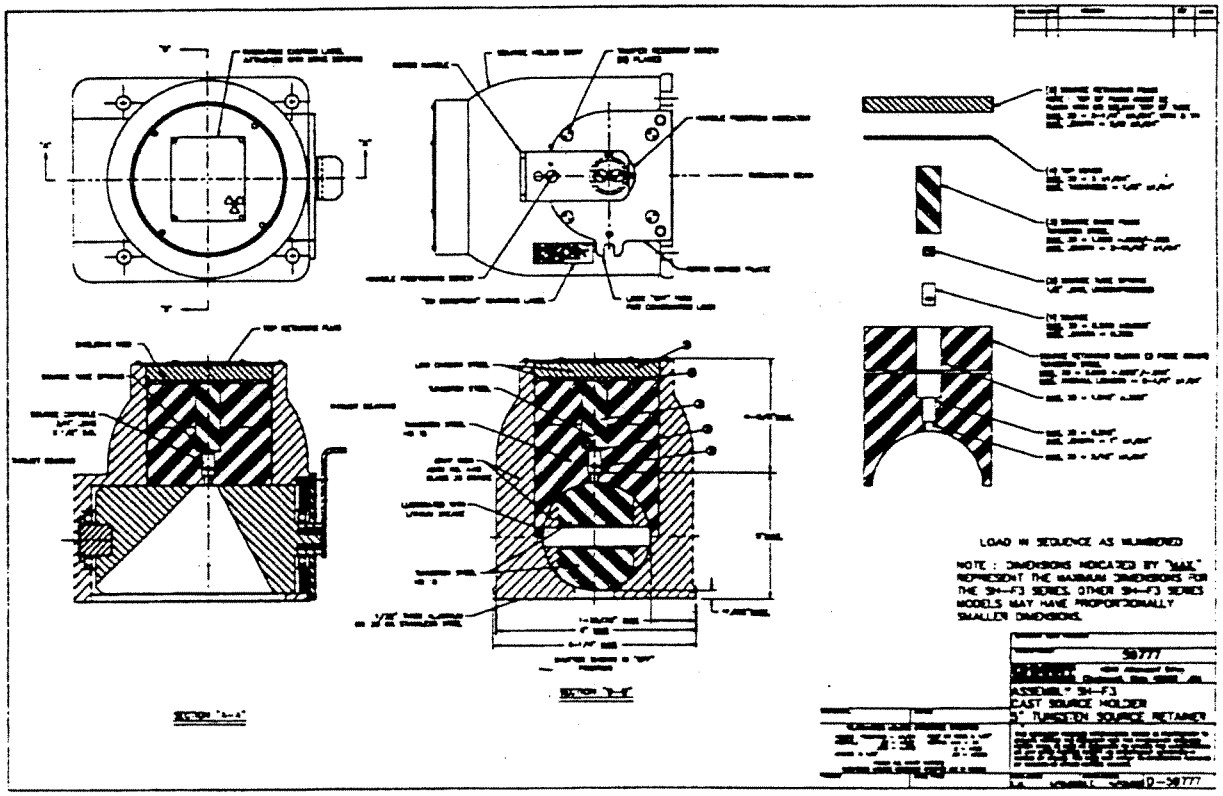
NO.: CA0215D104G DATE: August 18, 2000 ATTACHMENT 3



Source housing assembly of the Ohmart SH-F2 gauge

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

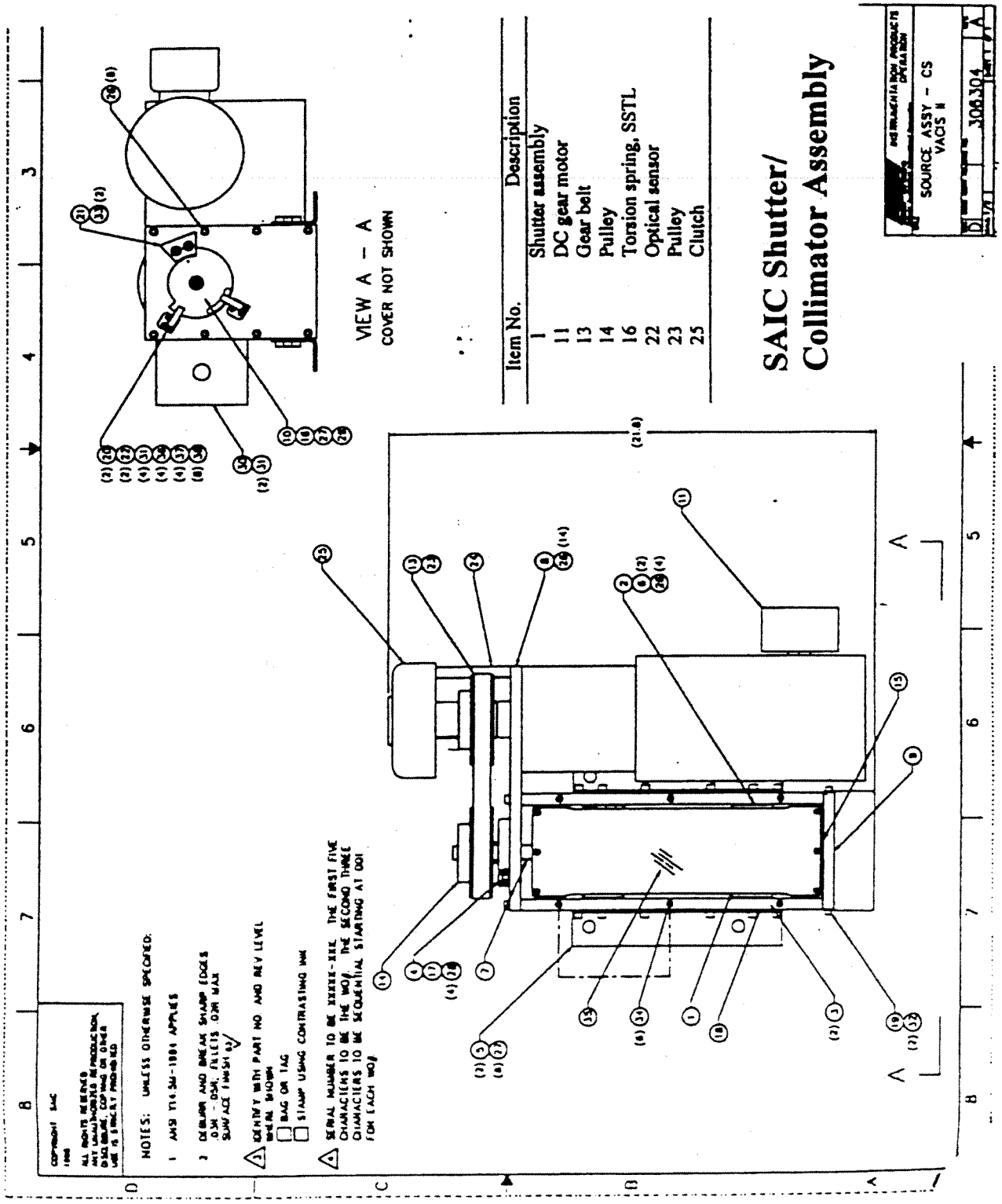
NO.: CA0215D104G DATE: August 18, 2000 ATTACHMENT 4



Source housing assembly of the Ohmart SH-F3 gauge

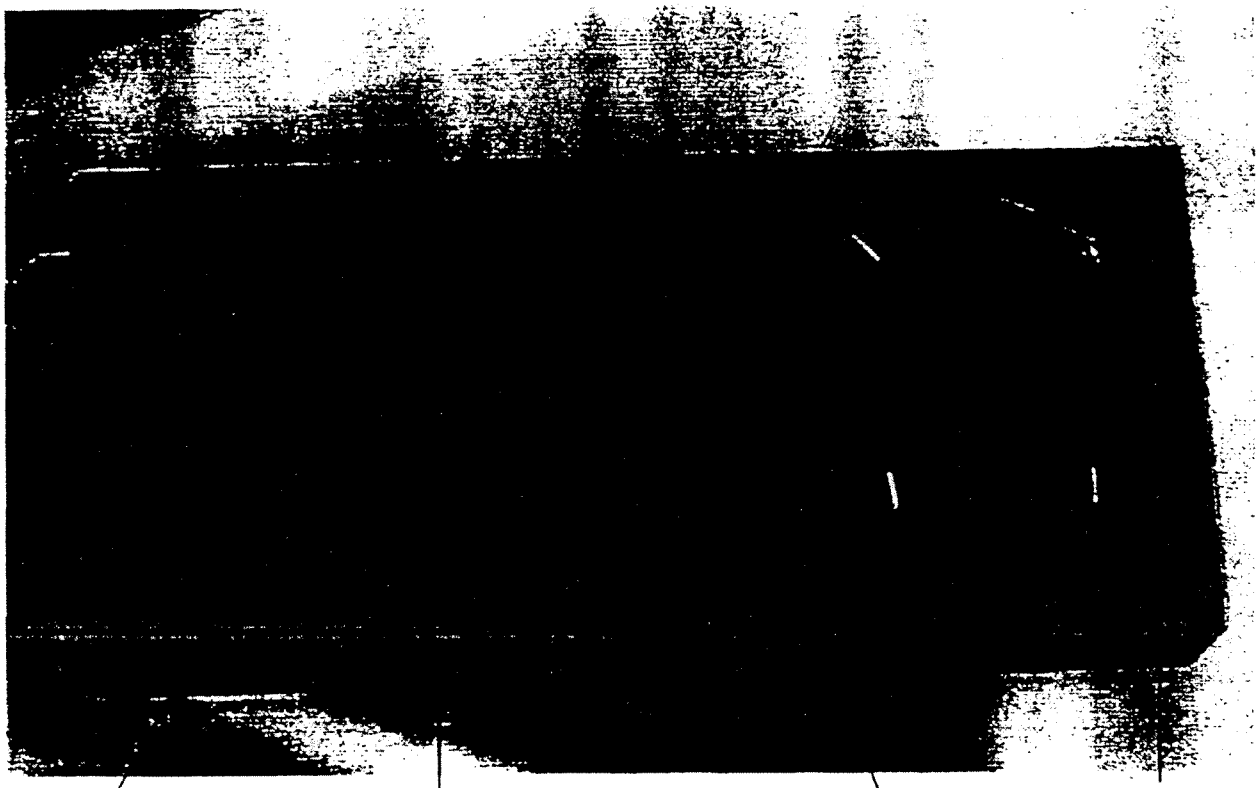
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: CA0215D104G DATE: August 18, 2000 ATTACHMENT 5



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: CA0215D104G DATE: August 18, 2000 ATTACHMENT 6



Shutter control box

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: CA0215D104G DATE: August 18, 2000 ATTACHMENT 7

SCIENCE APPLICATIONS INTERNATIONAL, INC.
16701 WEST BERNARDO DRIVE
SAN DIEGO, CA 92127
(619) 646-9712

REMOVAL OF THIS LABEL IS PROHIBITED.

CAUTION

FLASHING RED LIGHT: RADIATION BEAM ON.

REMOVAL OF THIS LABEL IS PROHIBITED.

THE RECEIPT, POSSESSION, USE, AND TRANSFER OF THIS DEVICE, MODEL VACIS II, SERIAL NO. _____, ARE SUBJECT TO A GENERAL LICENSE OR THE EQUIVALENT AND THE REGULATIONS OF THE U.S. NRC OR OF A STATE WITH WHICH THE NRC HAS ENTERED INTO AN AGREEMENT FOR THE EXERCISE OF REGULATORY AUTHORITY.

ISOTOPE: CS-137
ACTIVITY: _____
DATE OF ASSAY: _____

THIS DEVICE SHALL BE LEAK TESTED BY A SPECIFIC LICENSEE AT INTERVALS NOT TO EXCEED 12 MONTHS. THIS DEVICE SHALL BE INSPECTED ANNUALLY BY SCIENCE APPLICATIONS INTERNATIONAL, INC. OR AUTHORIZED SPECIFIC LICENSEE.

THIS LABEL SHALL BE MAINTAINED ON THE DEVICE IN A LEGIBLE CONDITION. REMOVAL OF THIS LABEL IS PROHIBITED.

CAUTION - RADIOACTIVE MATERIAL

WARNING - DO NOT MOVE ENCLOSURE

ENCLOSURE OR TRACK/TROLLEY MAY BE MOVED ONLY BY SCIENCE APPLICATIONS INTERNATIONAL, INC. OR AUTHORIZED SPECIFIC LICENSEE.

REMOVAL OF THIS LABEL IS PROHIBITED.

Labels on source environmental enclosure

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: CA0215D104G DATE: August 18, 2000 ATTACHMENT 8

Secured to physical barrier that defines exclusion area. Labels spaced at no more than 30 feet apart.

WARNING - DO NOT MOVE BARRIER

BARRIER MAY BE MOVED ONLY BY SCIENCE APPLICATIONS INTERNATIONAL, INC. OR AUTHORIZED SPECIFIC LICENSEE.

REMOVAL OF THIS LABEL IS PROHIBITED.

Bolted on detector tower:

WARNING - DO NOT MOVE TOWER

DETECTOR TOWER OR TRACK/TROLLEY MAY BE MOVED ONLY BY SCIENCE APPLICATIONS INTERNATIONAL, INC. OR AUTHORIZED SPECIFIC LICENSEE.

REMOVAL OF THIS LABEL IS PROHIBITED.

CAUTION

FLASHING RED LIGHT: RADIATION BEAM ON.

REMOVAL OF THIS LABEL IS PROHIBITED.

Bolted on outside of operator station (unless permanent structure):

WARNING - DO NOT MOVE OPERATOR STATION

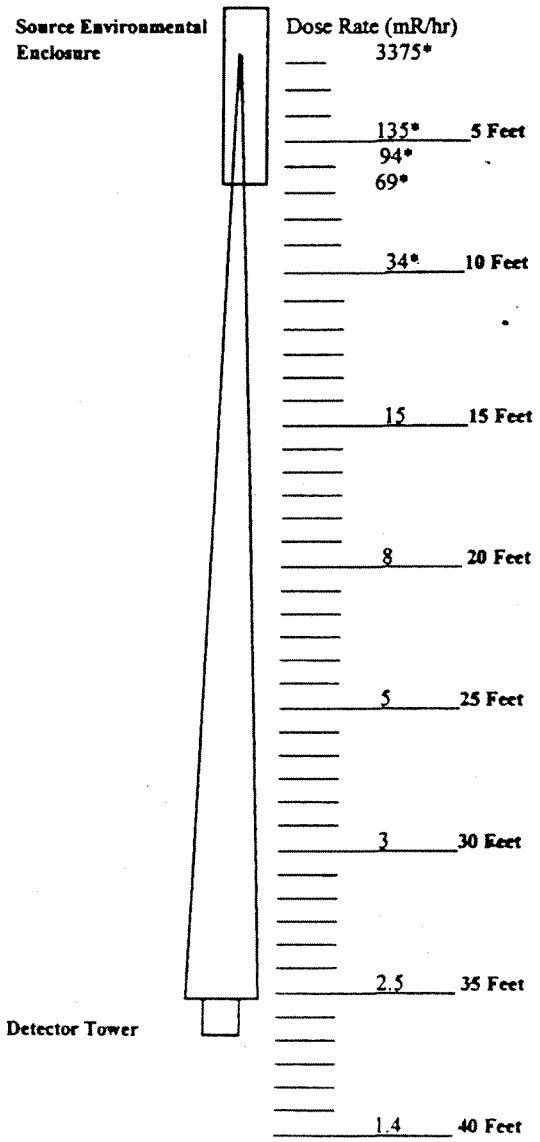
OPERATOR STATION MAY BE MOVED ONLY BY SCIENCE APPLICATIONS INTERNATIONAL, INC. OR AUTHORIZED SPECIFIC LICENSEE.

REMOVAL OF THIS LABEL IS PROHIBITED.

Labels on physical barrier, detector tower, and operator station

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: CA0215D104G DATE: August 18, 2000 ATTACHMENT 9



Dose Rates measured in centerline of beam

* Indicates that the inverse square law was incorporated to calculate dose rates (using the measured dose rate at 15 feet)

BEAM WIDTH PROFILE			
Distance	Intensity		
	Full	½	None
10 Feet	7.5"	10"	12.5"
35 Feet	26"	35"	44"
40 Feet	32"	40"	48"

Exposure rates with beam ON (30 foot source-to-detector installation with a 1.0 Ci Cs-137 source)

APPENDIX B

Registry of Radioactive Sealed Sources and Devices; Safety Evaluation of Device; Model – Mobile VACIS; No. CA0215D103S; Date – 24 August 2000

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO.: CA0215D103S DATE: **August 24, 2000**

DEVICE TYPE: Mobile gauge for inspecting cargo containers and vehicles

MODEL:	Mobile VACIS
MANUFACTURER/ DISTRIBUTOR:	Science Applications International, Inc. 16701 West Bernardo Drive San Diego, CA 92127
SEALED SOURCE MODEL DESIGNATION:	Minnesota Mining and Manufacturing Co. Model 4F6S Monsanto Research Company Model 24148 Amersham Corporation Models CDC.700 and CDC.711m

ISOTOPE:	MAXIMUM ACTIVITY:
Cs-137	1.6 Ci (59 GBq)

LEAK TEST FREQUENCY: 12 Months

PRINCIPAL USE: (D) Gamma Gauge

CUSTOM DEVICE: _____ YES __X__ NO

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

DEVICE TYPE: Mobile gauge for inspecting cargo containers and **vehicles**

DESCRIPTION:

Overview The Mobile VACIS device is designed to non-intrusively examine the contents of cargo containers and vehicles. A fan beam of Cs-137 gamma rays and an array of NaI detectors are used to measure density within cargo containers and vehicles. Software is used to generate a map of measured density, which a system operator views and manipulates to identify contraband.

The general features and layout of the device are shown in Attachments 1 and 2. The device is mounted on a truck as shown in Attachment 1. A scan of a cargo container or vehicle is obtained using the setup shown in Attachment 2. The device requires at least two, fully trained operators. One operator sits in the cab of the Mobile VACIS truck. The second operator assists the operator in the cab, helps with positioning the Mobile VACIS device, cargo container, or vehicle, and helps ensure radiation safety. An Ohmart SH-F2 **or SH-F3** gauge containing a Cs-137 source with a maximum activity of 1.6 Ci is mounted to the end of the boom arm. A 16 foot high detector tower, which houses an array of approximately 256 NaI detectors (tower height and number of detectors may vary depending on customer requirements), is mounted to a hydraulic controlled support structure that rotates into the vertical operating position. The system is designed such that the beam, when ON, is always directed at the detector tower. The average exposure rate behind the tower is less than 3 mrem/hr. A transmission scan is obtained by advancing the Mobile VACIS truck relative to the vehicle. Alternatively, the Mobile VACIS truck can remain stationary and the vehicle can be driven forward so that the container is scanned. The shutter on the gauge is operated remotely from the cab. The shutter is ON only during a scan.

Measured count rates are dependent upon the density of material within the cargo container **or vehicle**. For operations in which the Mobile VACIS truck is stationary, Pilasters (lane markers), signage, and a second operator are used to guide trucks or vehicles between the source and detector tower. For trucks, the driver of the truck pulls up to a marked position, and an operator reviews the cargo weight ticket. The operator asks the driver if there are any persons or animals in the cargo container; if so, the cargo container is not scanned. The operator then verifies that there are no persons in the exclusion zone that has been established around the Mobile VACIS device. Afterwards, the cab operator opens the beam and asks the truck driver to pull forward so that the cargo is scanned. The cab operator closes the shutter after the truck is scanned. As a backup safety feature, the shutter closes automatically after a preset time limit (adjustable, but nominally 10 seconds; maximum preset time is 120 seconds).

DEVICE TYPE: Mobile gauge for inspecting cargo containers and **vehicles**

For operations in which the Mobile VACIS truck is moved to obtain the scan (cargo container or vehicle stationary), the driver of the vehicle may or may not be present. If the driver is present, he is asked if there are any persons or animals present in the **vehicle or** cargo container; if so, the **vehicle or** cargo container is not scanned. **If no driver is present, a reasonable attempt shall be made to ensure that there are no persons or animals present prior to scanning.** Scanning of cargo containers that have not been readied for transport is authorized. Details of each system component follow.

Source assembly **Engineering drawings of the Ohmart SH-F2 and SH-F3 gauge source housing assemblies are shown in Attachments 3a and 3b, respectively. These Ohmart gauges are described in Sealed Source and Device Registration OH522D102B, which supercedes KY512D101B.** The source housing assembly of the Ohmart gauge is not altered in this application. **The Mobile VACIS device uses the 0-45 degree collimator (SH-F2) or 0-60 degree collimator (SH-F3). A lead collimator is used such that the fan beam has a divergence with a half-angle of 5 degrees.** In the OFF position, the beam is blocked with a minimum of 3 1/2" of lead and tungsten. In addition, a ¾" thick lead plate has been added on two sides of the gauge to reduce the exposure rate to the cab operator. **The ANSI N538-1979 classification of these gauges is ANSI 34-454-454-R2.** Sources used in the gauge have an ANSI N542-1977 classification of C43344 or higher, which exceeds the performance requirement of C43232 for gamma gauges that have the source protected inside the device. The gauge shutter is operated from a control box located in the cab of the Mobile VACIS truck. **For the SH-F2 gauge, the shutter is motor driven and electric power (diesel or gasoline generator producing 115 volts AC) is needed to both open and close the shutter. A trickle-charged battery, integral to the gauge, is used to ensure that the gauge shutter may be closed even with loss of electric power from the truck. For the SH-F3 gauge, the shutter is motor driven and electric power is needed to open the shutter. The SH-F3 gauge may be purchased with the battery backup or with a fail-safe design that uses a torsion spring to automatically close the shutter upon loss of electric power. Both gauges are designed so that a padlock may be used to secure the source in the OFF position.** Procedures require that the source be so secured except when the device is being used for scanning or testing operations or for maintenance.

The Ohmart gauge is kept dry and protected from harsh weather by an environmental enclosure. The enclosure is 10.5" wide, 18.5" deep, and 26.25" tall. The enclosure is made of 0.090" stainless steel or 0.040" aluminum or 0.125" fiberglass. The Ohmart gauge and environmental enclosure are bolted to the boom tip, telescoping arm of the

DEVICE TYPE: Mobile gauge for inspecting cargo containers and **vehicles**

Mobile VACIS truck. The access panel on the enclosure is always locked to prevent unauthorized entry. Only SAIC or other specific licensee may access the gauge. A shielded storage box with up to ¾" lead plate is secured to the back end of the Mobile VACIS truck. The Ohmart gauge/environmental enclosure are stored within the shielded box during transport or when the device is not being used for scanning operations. The shielded storage box is locked to preclude unauthorized access to the gauge. Only persons specifically licensed or otherwise authorized have access to the key. In addition, the Mobile VACIS truck must be started and the hydraulic lift actuated to remove the gauge/environmental enclosure from the shielded storage box. These security features, as well as product labeling, preclude accidental exposure or tampering with the radioactive source.

The beam ON/OFF status is shown by four, prominently visible flashing red light indicators and an audible alarm. Two flashing red light indicators are positioned on the gauge environmental enclosure; the other flashing light indicators are positioned on top of the cab. The audible alarm is also positioned on the enclosure. The light and audible alarm indicators are ON whenever the gauge shutter is not closed. The shutter position is determined from a control signal from the gauge. Legible signs, one at the gauge environmental enclosure, one on the detector tower, and one at the entry to the inspection station, shall describe the meanings of the light indicators and audible alarm. For the sign at the entry to the inspection station, a directive to STOP is made when the flashing red light indicator is ON. These signs shall be clearly legible at a distance of 40 m, day or night, and under reasonable weather conditions. During mobile operations when the Mobile VACIS truck is in motion during the scanning, only the signs on the gauge environmental enclosure and detector tower are needed.

Detector tower: The tower houses an array of approximately 256 NaI detectors (other types of detectors may also be used), with two or three detectors to a row. Crystal size is nominally 1.125" in diameter and 2.5" long. The detector array is enclosed within a weatherproofed environmental housing made of 0.090" stainless steel sheet. The detector tower is mounted to a movable assembly that positions the tower in line with the fan beam. Legible signs mounted on the tower shall describe the meanings of the light indicators and audible alarm.

Operator station and shutter control box The operator station is located within the cab of the Mobile VACIS truck. The cab operator controls the positioning of the detector tower and boom. The cab operator is also responsible for opening and closing the radiation beam.

The shutter control box is shown in Attachment 4. A key is needed to energize the control box. Only persons specifically licensed or otherwise authorized have access to the key. The control box has an OPEN pushbutton/red light indicator, CLOSED pushbutton/green light indicator, emergency stop button, and a selector knob for manual or automatic control of the gauge shutter. A flashing red light indicates that the shutter is opening or closing. A red light indicates that the gauge shutter is open. A green light indicates that the gauge shutter is closed. Pressing the emergency stop button closes the gauge shutter. The shutter takes 5 seconds to close. When operating in manual mode, the cab operator needs to open and close the shutter. When in automatic mode, the operator initiates the scan using the system computer and software controls the opening and closing of the shutter. When shutting the system down, the operator closes the gauge shutter, turns the system power key to the off position, and then turns the computer system off. As a backup safety feature, the system is designed such that if the shutter were left open, it would close when the control box key is turned to the off position. The emergency stop will also close the shutter.

The computer imaging system is also located within the operator station. A density map of the cargo container **or vehicle** is constructed in real time and displayed on a monitor. The density map is stored and reviewed by the system operator.

System layout The system layout during a scanning operation is shown in Attachment 2. There are two modes of operation. In one mode, the Mobile VACIS truck is stationary. Heavy lane markers (Pilasters) and signage are set up to guide vehicles in between the source and detector tower. Additional lane markers and traffic control signage may be needed to ensure safe passage of the vehicle in between the source and detector tower. If operations are conducted such that the boom is not used to retract the source after each vehicle is scanned, a physical barrier must be established around the source that would preclude a vehicle from accidentally striking the source. Before opening the beam, the operator checks to ensure that no persons are in the exclusion area. A second operator is required, as part of this registration, to help guide the vehicles into position and ensure that there are no persons in the exclusion area.

In the second mode of operation, the Mobile VACIS truck is driven to the cargo container **or vehicle**, and the Mobile VACIS truck is in motion during the scan (the cargo container **or vehicle** is stationary). In this case, the lane markers and traffic control signage are not needed. A second operator is still required with this mode of operation.

DEVICE TYPE: Mobile gauge for inspecting cargo containers and **vehicles**

System operation Details on the operation of the Mobile VACIS device are provided in the Operator's Manual. Operator training is provided by SAIC or their authorized representative. Operating steps provided here are applicable when the device is stationary and vehicles are pulling up to the device. Comparable steps are followed, as appropriate, during mobile operations. The basic operating steps are: (1) An exclusion zone is set up around the **Mobile VACIS** truck. The size of the exclusion zone is established from previous experience. The exclusion zone is demarcated with rope and signage that indicates a High Radiation Area. Exposure rates at the exclusion zone boundary are less than 0.5 mrem per hour. (2) Pilasters, lane markers, and associated signage are set up and positioned. (3) The computer system is turned on and the key is used to energize the control box. A password is available for use to access system software to open the shutter. (4) The truck's diesel engine is started. (5) The detector tower and gauge are positioned using the vehicle's hydraulic lifts. (6) The shielded storage box that houses the Ohmart gauge is unlocked, the gauge is unlocked, and the locking pin is removed from the gauge. (7) The beam is opened, and the area is surveyed to verify that exposure rates outside the exclusion zone are less than 0.5 mrem per hour. The exposure rate shall be measured by a qualified operator using a calibrated survey meter. (8) An operational checklist is completed to ensure that the safety lights and audible beacon are functioning appropriately and that all required signage is in place. (9) Traffic control personnel direct the vehicle driver to drive forward and position the cargo container **or vehicle** between the source and detector tower. (10) For trucks, an operator reviews container weight ticket. (11) An operator asks the driver if there are any persons or animals in the cargo container **or vehicle**. If so, the vehicle is not scanned. (12) An operator verifies that the driver and any passengers are in front of the beam path. (13) The operators verify that there are no persons in the exclusion zone. (14) The cab operator starts the scan, either manually or automatically using the computer. This opens the shutter, and an operator asks the driver to pull forward. (15) The density map is acquired and stored. (16) The shutter is closed, either manually, automatically through system software, or by the safety-related timeout. (17) System operator inspects density map to identify any contraband or stolen automobiles. (18) Steps 9 through 17 are repeated for each vehicle undergoing a density measurement. (19) At the end of operations, the shutter is closed and the key is removed from the control box. The computer system is turned off. The detector tower and gauge are returned to their storage locations. The gauge is secured within the shield storage box. The shutter is secured with the locking pin and padlock. The shield box is also locked.

A comparable procedure is followed during mobile operations. Lane markers and traffic control signage, however, may not be needed. An exclusion zone demarcated with rope

and signage shall be established around every stationary cargo **container or vehicle** that is scanned. In addition, for vehicles, the driver may not be present.

LABELING:

Labeling of the Ohmart SH-F2 and SH-F3 gauges is described in Sealed Source and Device Registration OH522D102B, which supersedes KY512D101B. When these gauges are used in the Mobile VACIS device, the gauge's general license label is not used.

Labels on the shutter control box are shown in Attachment 4. Additional labels are shown in Attachment 5. The device is labeled in accordance with ANSI N538-1979. The control box has the following additional label: "DO NOT INTENTIONALLY EXPOSE PERSONS OR ANIMALS TO THE RADIATION BEAM." Each label shall bear the statement, "Removal of this label is prohibited." **The labels are made of 28-gauge, marine aluminum or type 304 stainless steel, with a yellow background and black lettering etched or stamped 0.003" deep.** Labels and lettering are sized appropriately, and are permanently attached by rivets or screws to the device.

DIAGRAMS:

There are eight (8) attachments.

Attachment 1: Photograph of Mobile VACIS device.
Attachment 2: Mobile VACIS device being used to detect contraband in a commercial truck.
Attachment 3a: Source housing assembly of the Ohmart SH-F2 gauge.
Attachment 3b: Source housing assembly of the Ohmart SH-F3 gauge.
Attachment 4: Shutter control box.
Attachment 5: Labels.
Attachment 6: Exposure rates with beam ON (Source boom left).
Attachment 7: Exposure rates with beam ON (Source boom right).

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

DEVICE TYPE: Mobile gauge for inspecting cargo containers and **vehicles**

CONDITIONS OF NORMAL USE:

The Mobile VACIS device is designed to detect contraband in cargo containers and vehicles. The devices will be subjected to outdoor environments. The gauge is kept dry and otherwise protected from harsh weather by an enclosed environmental housing. The detector array is also enclosed within an environmental housing.

The Mobile VACIS device uses an Ohmart Inc. Model SH-F2 **or SH-F3 gauge,** which have been designed for the following environments:

Temperature	-40C to 60C (-40F to 140F)
Pressure	Atmospheric
Vibration	Ranges from zero to mild
Corrosion	Ranges from zero to highly corrosive vapors
Impact	Accident conditions only
Fire	Unlikely
Explosion	Unlikely

These environments meet or exceed those in which the Mobile VACIS device is used. The gauge is secured within the locked, shielded storage box during transport or whenever scanning operations are not being conducted.

SAIC reports that the working life of the Mobile VACIS device is 30 years, unrelated to the decay of the Cs-137. SAIC, however, recommends that the source be exchanged every 15 years due to decay of the Cs-137 ($T_{1/2}$ = 30.2 years).

PROTOTYPE TESTING:

Credit for prototype testing the Mobile VACIS device is provided by the prototype testing documented for the Ohmart Inc. **Model SH-Fx series gauges.** The ANSI N538-1979 classification of the SH-Fx series gauge is **ANSI 34-454-454-R2.** The SH-Fx series gauge passed all tests for Type A packaging, including water spray, 30 foot drop, compression, and penetration tests. The similar Model SH-F1 gauge passed the following environmental performance tests:

DEVICE TYPE: Mobile gauge for inspecting cargo containers and **vehicles**

Temperature	800C (1472F) for 30 minutes.
Vibration	0-50 cps at amplitude 0-1/16" for 16 hours.
OFF/ON Mechanism	Operated several hundred cycles.
Impact	Several hundred blows with a 1/2 pound hammer.

The sealed sources used in the Ohmart Model SH-F2 **or SH-F3** gauges have achieved the following ANSI N542-1977 classifications:

Manufacturer	**Model**	**ANSI N542 - 1977 Classification**
Minnesota Mining and Manufacturing Co.	Model 4F6S	**C66546**
Monsanto Research Company	Model 24148	C43344
Amersham Corporation	Model CDC.700	C66445
Amersham Corporation	Model CDC.711m	C66646

The device is a mobile unit and shall be operated in compliance with 10 CFR 71 and applicable requirements of 49 CFR Subchapter C – Hazardous Material Regulations.

EXTERNAL RADIATION LEVELS:

SAIC provided exposure rates around the gauge environmental enclosure, along the beam path between the source and detector array, and at the operator station. Measured exposure rates around the gauge environmental enclosure are provided in Table 1 below. Measured exposure rates are for a 1.6 Ci Cs-137 source **and the Ohmart SH-F2 gauge.** Exposure rates measured around a 1.6 Ci Mobile VACIS device shall not exceed the values presented in Table 1.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

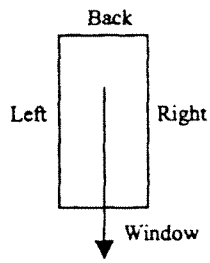
NO.: CA0215D103S DATE: **August 24, 2000** PAGE 10 OF 14

DEVICE TYPE: Mobile gauge for inspecting cargo containers and **vehicles**

Table 1. Measured exposure rates around the gauge enclosure containing a 1.6 Ci Cs-137 source.

Distance		Window side		Left/right side		Back side		Top side		Bottom side	
(in)	(cm)	(mR/hr)	(μSv/hr)	(mR/hr)	(μSv/hr)	(mR/hr)	(μSv/hr)	(mR/hr)	(μSv/hr)	(mR/hr)	(μSv/hr)
2.0	5	1) 1.2	12	24	240	13	130	13	130	17	170
		2) 2600	26000	28	280	14	140	15	150	22	220
11.8	30	1) 0.46	4.6	3.5	35	2.0	20	2.2	22	1.9	19
		2) 650	6500	5.0	50	2.1	21	3.3	33	4.2	42
39.4	100	1) 0.2	2	0.55	5.5	0.4	4	0.1	1	0.4	4
		2) 290	2900	0.9	9.0	0.5	5	0.4	4	0.8	8

Note: Measured exposure rates are reported for two different shutter conditions:
1) Ohmart gauge shutter closed.
2) Ohmart gauge shutter open.
Values reported in Table 1 are the maximum exposure rates measured along each face of the environmental enclosure **using the Ohmart SH-F2 gauge. Except for the window side, condition 2, SAIC reports that exposure rates with the Ohmart SH-F3 gauge are significantly lower than those shown in Table 1.**



Exposure rates around the device are only slightly affected by shutter position, except on the window side. When the device is not in operation (gauge stored within the shielded storage box that is mounted on the Mobile VACIS truck), the dose rate to a person standing next to the storage box is less than 0.7 mrem in any one hour.

Exposure rates in the beam are shown in Attachments 6 and 7. The exposure rate at the beam exit, 30 cm from the environmental enclosure, is 650 mR/hr. A high radiation area, as defined in 10 CFR 20.1003 (dose equivalent in excess of 100 mrem in 1 hour at 30 cm), is produced by this beam. This area shall be conspicuously posted with signs bearing the radiation symbol and the words "CAUTION, HIGH RADIATION AREA," pursuant to 10 CFR 20.1902. Posting procedures are described in the Operator's Manual. This area does not need to be posted when the device is not in operation.

SAIC calculated the radiation dose that would be received by a person who unknowingly was in the cargo container of a scanned truck **or vehicle**. SAIC reported that the person would receive a deep-dose equivalent of 5 μrem, based upon dose measurements. The person in the cargo container **or the portion of the vehicle that is scanned** would pass through the beam during a density measurement. In addition, SAIC reported that the deep-dose equivalent received by the truck driver, passenger, passenger in the sleeper, or

DEVICE TYPE: Mobile gauge for inspecting cargo containers **and vehicles**

vehicle driver is conservatively estimated at 5 μrem. These persons do not pass through the beam during a density measurement.

Blinders (3/4" thick lead plates) have been added on two sides of the gauge to reduce the exposure rate in the operator's station. When the beam is turned ON, the exposure rate inside the operator's station does not increase by more than 30 μR/hr above background. This increase was measured while a typical cargo container was being scanned.

QUALITY ASSURANCE AND CONTROL:

SAIC maintains a quality assurance and control program that has been deemed acceptable for licensing purposes by the California Department of Health Services. A copy of the program is on file with the California Department of Health Services.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- The Mobile VACIS device is to be used only to non-intrusively examine the contents of cargo containers and vehicles.
- A minimum of two operators, fully trained by SAIC or their authorized representative, shall be present during operation of the Mobile VACIS device.
- The device shall be distributed to persons specifically licensed by the NRC, an Agreement State, or a Licensing State.
- Handling, storage, use, transfer, and disposal: To be determined by the licensing authority.
- The device shall be leak tested prior to initial use and at intervals not to exceed 12 months using techniques capable of detecting 0.005 microcurie (185 Bq) of removable contamination.
- The gauge shutter, indicator lights, and audible warning shall be tested at the start of every operating shift. A radiation survey, documenting that the exposure rate at the exclusion zone boundary is less than 0.5 mrem/hr, shall also be done at the start of every operating shift (for stationary operations) or for every stationary cargo that is scanned (for mobile operations).

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO.: CA0215D103S DATE: **August 24, 2000** PAGE 12 OF 14

DEVICE TYPE: Mobile gauge for inspecting cargo containers and **vehicles**

- SAIC or authorized specific licensee shall perform an annual inspection of the device. The annual inspection shall include an inspection of the gauge, boom arm, alignment of the beam with the detector tower, and other parts and functions of the device that are important to radiation safety.

- The layout of the device, particularly the locations of the source and detector tower, shall be consistent with ALARA.

- For sites with multiple devices in operation, exposure rates at one device may be affected by a beam ON condition at another device. Traffic flow and timing of the beam ON conditions shall be consistent with ALARA. The layout of the devices shall also be consistent with ALARA.

- The gauge shall be secured within the shielded storage box during transport and when the device is not being used for scanning. Both the gauge and storage box shall be locked.

- The exclusion zone area around the device shall be conspicuously posted with signs bearing the radiation symbol and the words "CAUTION, HIGH RADIATION AREA." The area shall be posted using procedures described in the Operator's Manual. This area does not need to be posted when the gauge is secured within the storage box.

- Pursuant to 10 CFR 20.1902, the gauge enclosure and the gauge's shielded storage box shall be posted with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL."

- SAIC or authorized specific representative shall provide operator training. Training shall include procedures to be followed if the shutter fails to close or if the gauge environmental enclosure is damaged.

- For stationary operations, signage, lane markers, and cones are used to control traffic flow and safely guide the vehicle between the gauge and detector tower. SAIC reported that an accidental collision between a vehicle and the gauge would be unlikely.

DEVICE TYPE: Mobile gauge for inspecting cargo containers and **vehicles**

- Signage, lane markers, and cones also restrict pedestrian access around the Mobile VACIS device. In addition, the operators of the device shall ensure that the exclusion zone is clear of persons prior to opening the beam.

This registration sheet and the information contained within the references shall not be changed without the written consent of the California Department of Health Services.

SAFETY ANALYSIS SUMMARY:

Based upon review of the Mobile VACIS device, and the information and test data cited below, we **continue to** conclude that the device is acceptable for licensing purposes.

Furthermore, we **continue to** conclude that the device would be expected to maintain its containment integrity for normal conditions of use and accidental conditions that might occur during uses specified in this certificate.

REFERENCES:

The following supporting documents for the Mobile VACIS device are hereby incorporated by reference and are made a part of this registry document.

- SAIC's application dated January 27, 2000, with enclosures thereto.
- SAIC's letters dated May 1, 2000, **August 21, 2000, and August 24, 2000,** with enclosures thereto.
- SAIC's electronic mail dated April 29, 2000.
- SAIC's facsimile dated April 27, 2000.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO.: CA0215D103S DATE: **August 24, 2000** PAGE 14 OF 14

DEVICE TYPE: Mobile gauge for inspecting cargo containers and **vehicles**

ISSUING AGENCY:

California Department of Health Services

Date: August 24, 2000 Reviewer: _____
Ronald Rogus, Ph.D.

Date: August 24, 2000 Concurrence: _____
David Wesley, M.S.

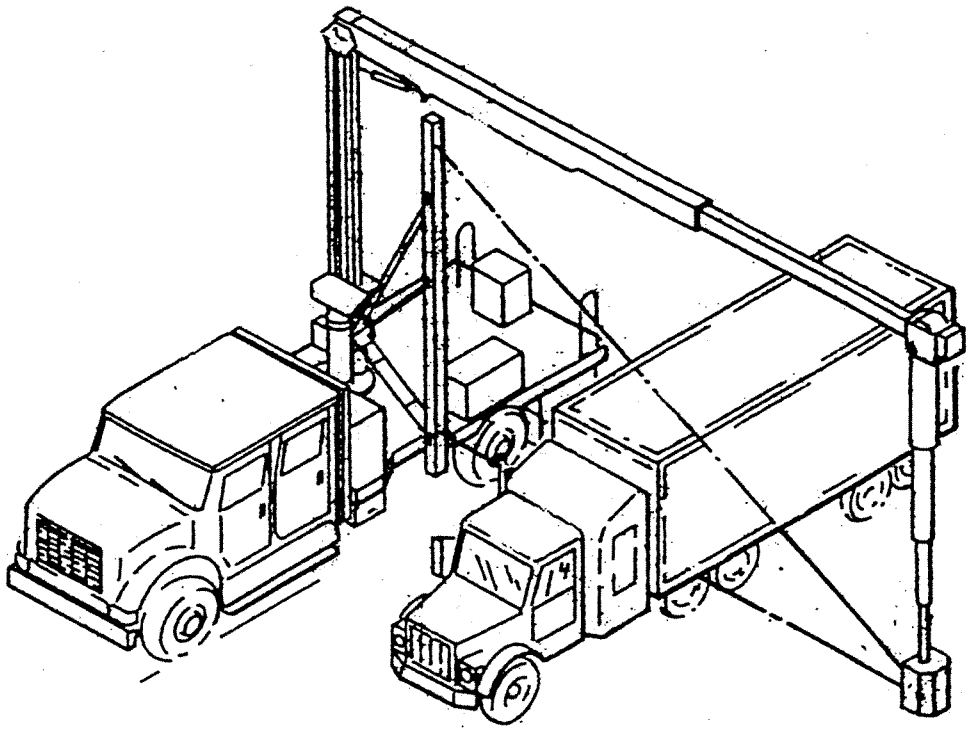
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO.: CA0215D103S DATE: **August 24, 2000** ATTACHMENT 1

Photograph of Mobile VACIS device

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

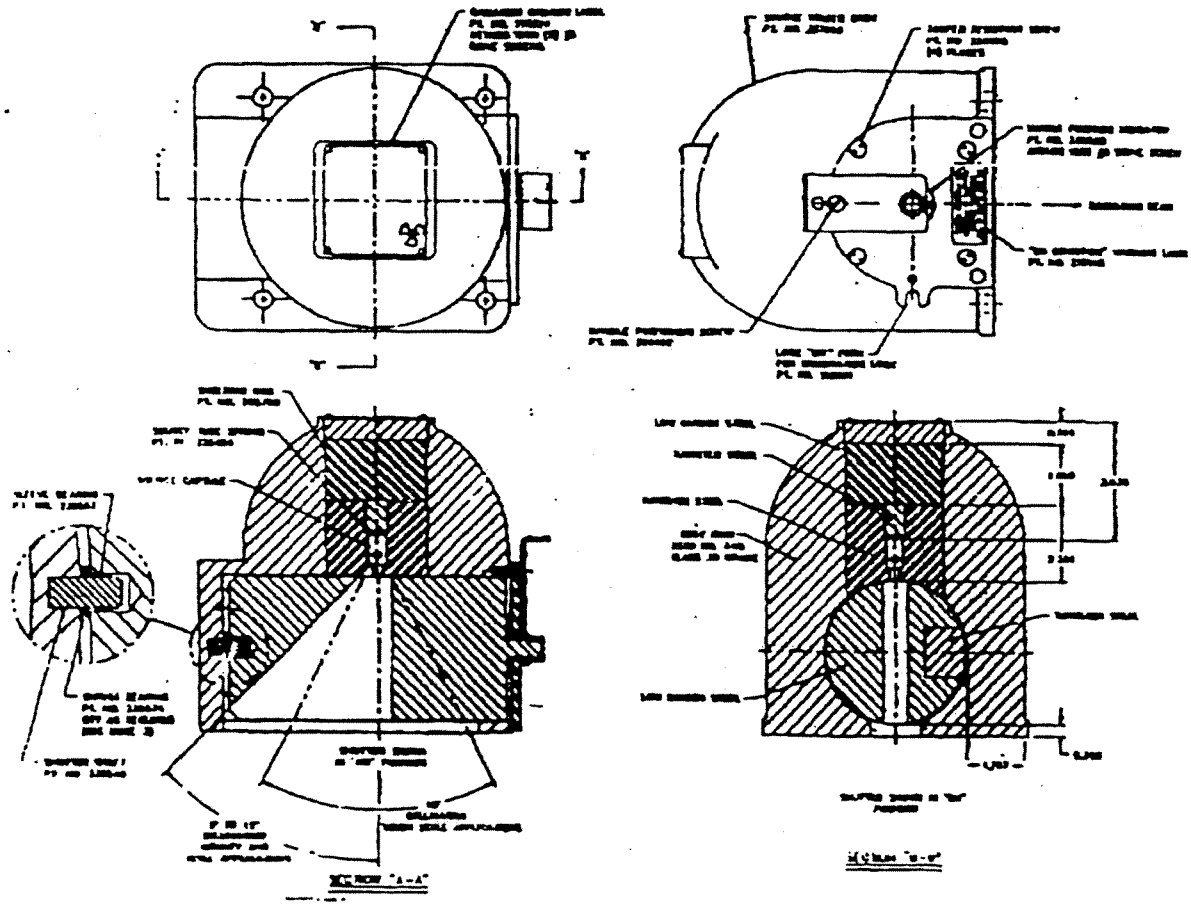
NO.: CA0215D103S DATE: **August 24, 2000** ATTACHMENT 2



Mobile VACIS device being used to detect contraband in a commercial truck

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

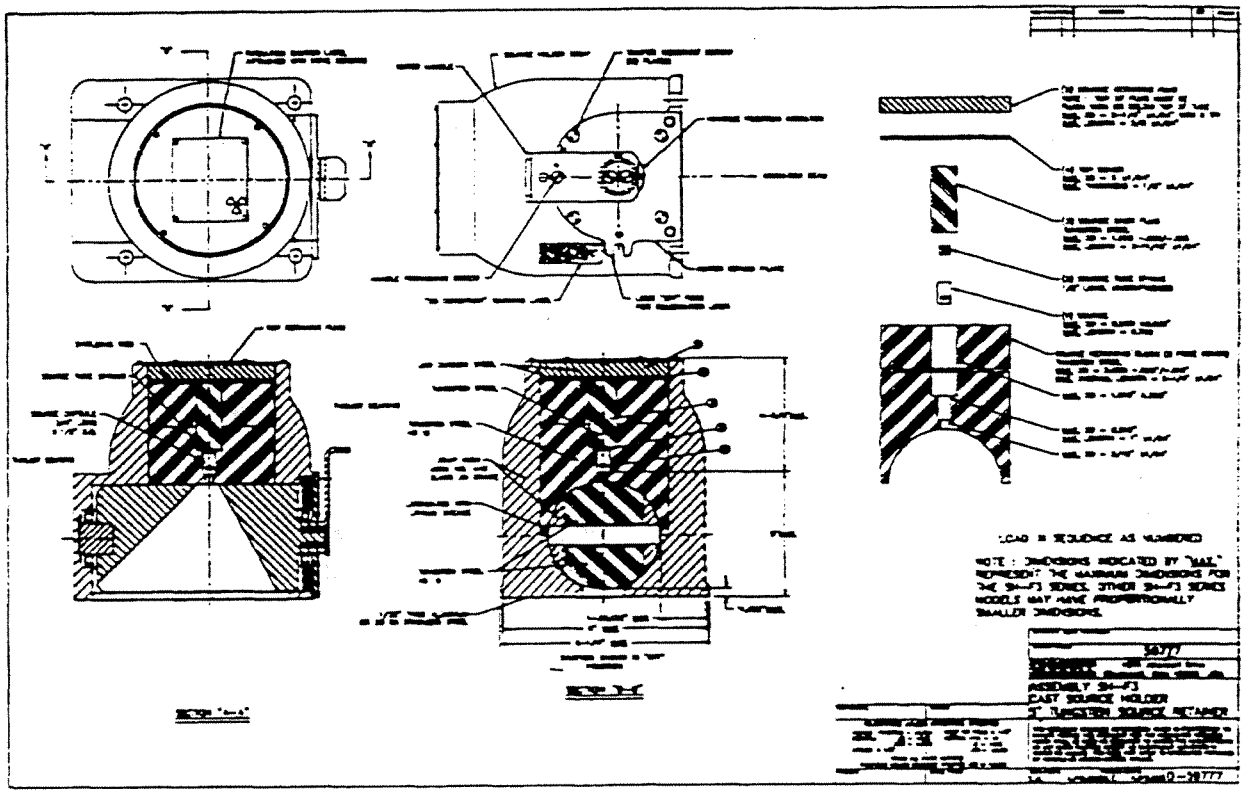
NO.: CA0215D103S DATE: **August 24, 2000** ATTACHMENT 3a



Source housing assembly of the Ohmart SH-F2 gauge

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

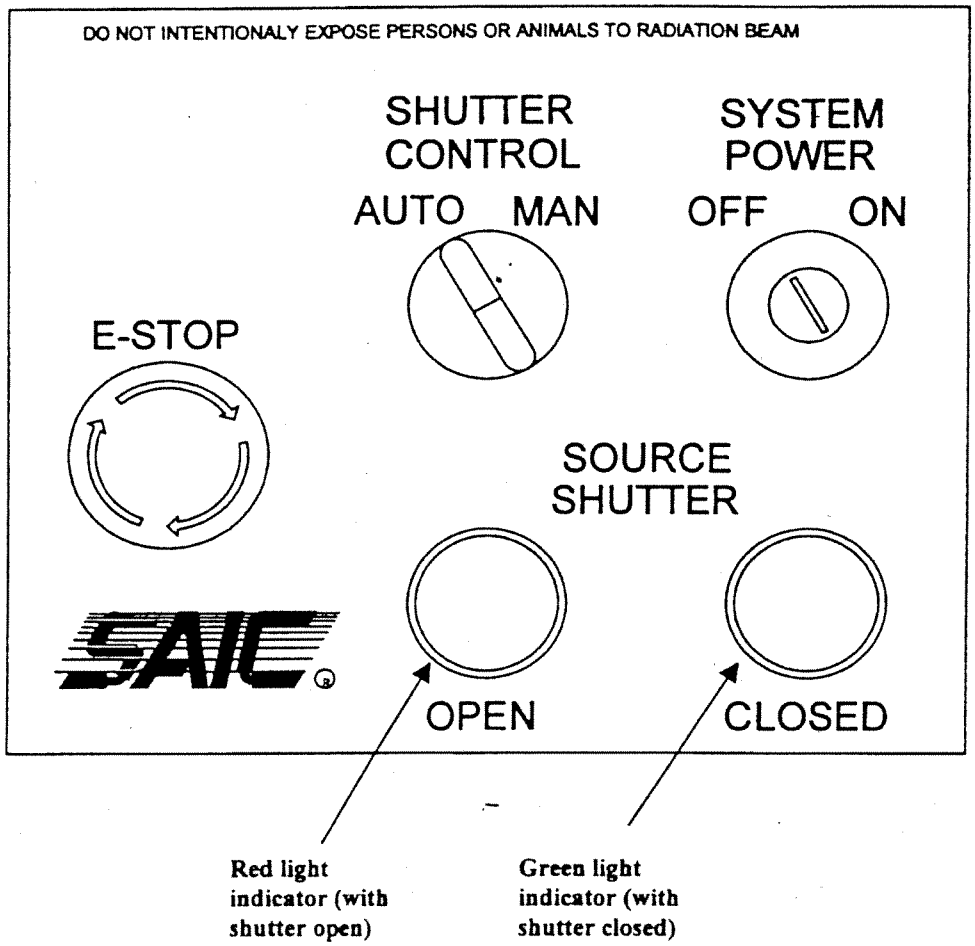
NO.: CA0215D103S DATE: **August 24, 2000** ATTACHMENT 3b



Source housing assembly of the Ohmart SH-F3 gauge

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO.: CA0215D103S DATE: **August 24, 2000** ATTACHMENT 4



Shutter control box

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO.: CA0215D103S DATE: **August 24, 2000** ATTACHMENT 5

Bolted on outside of source environmental enclosure, detector tower, and operator station:

SCIENCE APPLICATIONS INTERNATIONAL, INC.
16701 WEST BERNARDO DRIVE
SAN DIEGO, CA 92127
(619) 646-9712

REMOVAL OF THIS LABEL IS PROHIBITED.

CAUTION

FLASHING RED LIGHT: RADIATION BEAM ON

REMOVAL OF THIS LABEL IS PROHIBITED.

Bolted on outside of source environmental enclosure:

THE RECEIPT, POSSESSION, USE, AND TRANSFER OF THIS DEVICE, MODEL _____, SERIAL NO. _____, ARE SUBJECT TO A SPECIFIC LICENSE OR THE EQUIVALENT AND THE REGULATIONS OF THE U.S. NRC OR OF A STATE WITH WHICH THE NRC HAS ENTERED INTO AN AGREEMENT FOR THE EXERCISE OF REGULATORY AUTHORITY.

ISOTOPE: CS-137
ACTIVITY: _____
DATE OF ASSAY: _____

THIS DEVICE SHALL BE LEAK TESTED BY A SPECIFIC LICENSEE AT INTERVALS NOT TO EXCEED 12 MONTHS. THIS DEVICE SHALL BE INSPECTED ANNUALLY BY SCIENCE APPLICATIONS INTERNATIONAL, INC. OR AUTHORIZED SPECIFIC LICENSEE.

THIS LABEL SHALL BE MAINTAINED ON THE DEVICE IN A LEGIBLE CONDITION. REMOVAL OF THIS LABEL IS PROHIBITED.

CAUTION - RADIOACTIVE MATERIAL

Bolted on outside of gauge's shielded storage box: **CAUTION - RADIOACTIVE MATERIAL**

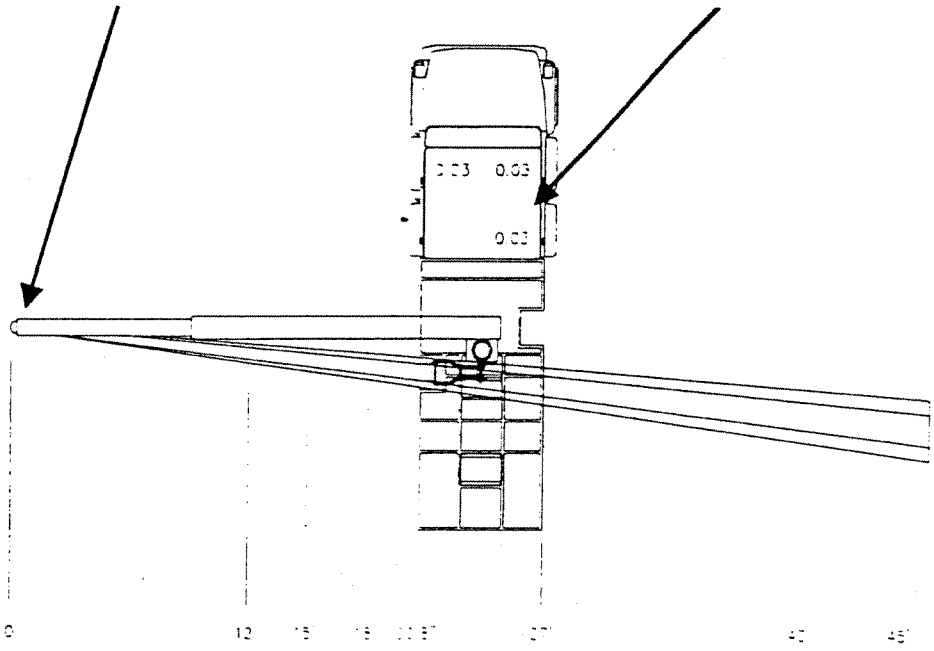
Labels

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO.: CA0215D103S DATE: **August 24, 2000** ATTACHMENT 6

Ohmart SH-F2 or SH-F3 gauge
Cs-137
1.6 Ci

Exposure rates measured in operator's area (mR/hr)

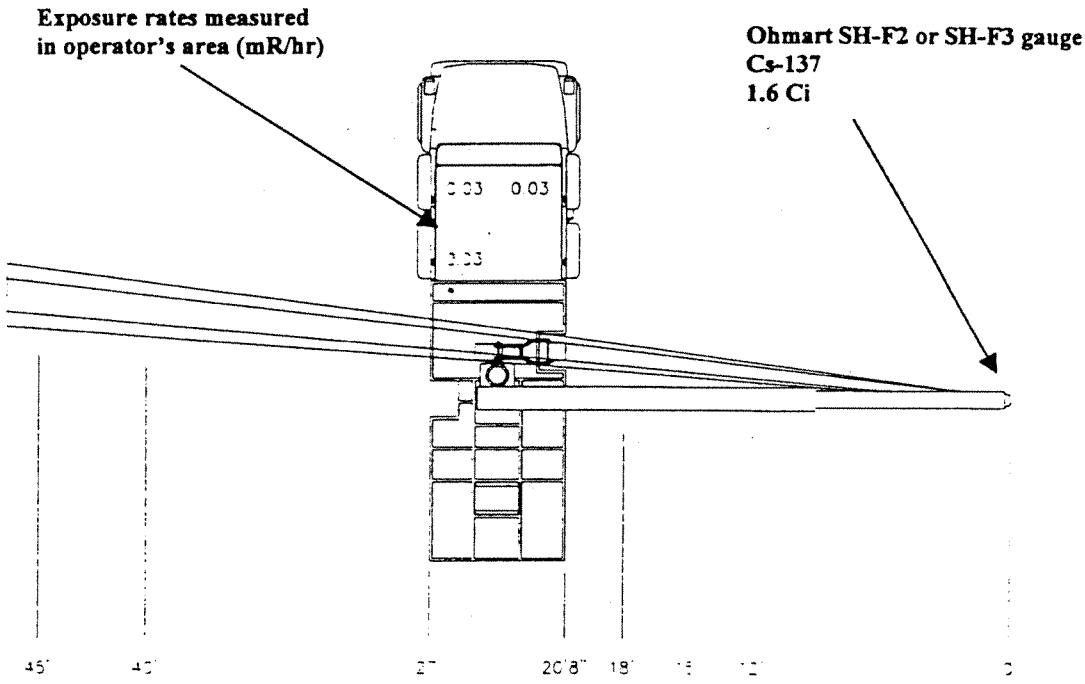


Dose rates measured from the source enclosure with the shutter open are as follows: 26 mR/hr at 12', 16.5 mR/hr at 15' (typical target centerline), 9 mR/hr at 20'8" (the detector tower face), 4.5 mR/hr at 27' (opposite side of truck bed), and 1.85 mR/hr at 45'. The addition of the SAIC collimator has set the beam width at 12" at 23' and a background dose rate (0.02 mR/hr) is measured at a distance of 10' of either side of the beam's centerline. The addition of lead lined toolboxes installed on the flatbed of the Mobile VACIS vehicle has reduced the measured dose rate at 27' from 4.5 mR/hr to 0.5 mR/hr.

Exposure rates with beam ON (source boom left)

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

NO.: CA0215D103S DATE: **August 24, 2000** ATTACHMENT 7



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Exposure rates with beam ON (source boom right)

APPENDIX C

Recommended Operating Procedures for the Vehicle and Cargo Inspection System (VACIS)

Recommended Operating Procedures

for the

Vehicle and Cargo Inspection System (VACIS)

February 15, 2000

RECOMMENDED OPERATING PROCEDURES

FOR THE

VEHICLE AND CARGO INSPECTION SYSTEM (VACIS)

1.0 INTRODUCTION. The intent of this document is to provide field operators with a set of general procedures associated with the Vehicle and Cargo Inspection System (VACIS). These procedures will address crew size, position requirements, general care and cleaning requirements, emergency procedures, along with instruction on obtaining the requisite support. In addition, the procedures shall be consistent and in compliance with the United States Nuclear Regulatory Commission Materials License Number 08-17447-01 as amended, May 26, 1998.

2.0 BACKGROUND. The VACIS is based on the Santa Teresa, NM and Port Everglades, FL prototype systems developed by Science Applications International Corporation (SAIC). The hardware contractor, SAIC, will initially install all production VACISs. If the system needs to be re-located for any reason, contact the National Enforcement Equipment Maintenance and Repair (NEEMR) Program (703-492-4242). NEEMR will arrange to have experienced professionals take the system down and re-install it. The VACIS is capable of scanning, in a single scan, vehicles up to the following criteria:

Maximum Scan:	70 feet at 10° scanning angle
Overall Height:	13 feet

The system is capable of processing a vehicle approximately every 4 minutes. This is based on normal scan speed for the full scan length. Since there are no vehicle weight or width restrictions, the VACIS is optionally suited for the inspection of vehicles that cannot meet the restrictions of the Truck X-ray.

3.0 SYSTEM DESCRIPTION. The VACIS is capable of effective and efficient Non-Intrusive Inspection (NII) of tankers, cargo vehicles, including trailer trucks, and trailer mounted sea and air containers. This system may also be used for inspection of smaller vehicles such as cars, pick-up trucks, and towed vehicles, e.g. trailers and boats. This system can be used to detect contraband located in the vehicle's structure, tires, gas tanks, and hidden compartments. The system is modular and is capable of being disassembled, relocated, and reassembled.

3.1 Detector Tower. The detector tower consists of 7 detector modules. Each module is 3' high and contains 48 detectors. The detector modules are mounted to a trolley that travels back and forth along the detector track.

3.2 Source Enclosure. The source enclosure contains the radiation source, one Curie of Cesium 137 that emits a gamma ray of 0.662 MeV and has a half-life of 30 years. Within the enclosure, the source can be moved up and down, and the scan angle can be changed. A scan angle of 10 degrees is recommended to obtain better scans of the front and back panels of the scanned vehicle. The source enclosure is mounted on a trolley that travels back and forth along the source track.

3.3 Detector and Source Tracks. The detector trolley and the source trolley moves along aluminum tracks. Each track is 90 feet long. The detector track is 6' wide while the source track is 4' wide.

3.4 Command Center. The Command Center contains the operator's console. On the roof of the Command Center is mounted a video camera. The video from the camera is displayed on a 9" monitor and on the operator's monitor. This camera can be used to obtain the container number.

4.0 SAFETY.

4.1 Personnel Safety.

4.1.1 Personal Monitoring Devices. NEEMR is establishing a personal monitoring device program for VACIS operators. The devices will measure the cumulative amount of radiation to which the operator has been exposed. These devices shall be worn at all times when operating the VACIS. The devices have a unique control number and are to be worn only by the person to which it is assigned. The devices will be sent to a processing lab every quarter to be read. The local VACIS Coordinator will issue and collect the devices, and send them for processing. If there are any high or questionable readings, the Radiation Safety Officer (RSO) immediately will evaluate and investigate the readings.

4.2 Safety Equipment. The system has incorporated several safety features.

4.2.1 Two Shutter Operation.

4.2.1.1 Primary Shutter. The source comes equipped with a primary shutter that operates on 110 VAC. It also has a battery backup that will close the shutter if power is lost. The primary shutter has a trickle charger that keeps the battery charged. During normal operation and

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4.2.1 Two Shutter Operation.

4.2.1.1 Primary Shutter. The source comes equipped with a primary shutter that operates on 110 VAC. It also has a battery backup that will close the shutter if power is lost. The primary shutter has a trickle charger that keeps the battery charged. During normal operation and

standby, the primary shutter opens when the shutter enable button is pushed.

4.2.1.2 Secondary Shutter. During scanning, the source is opened and closed with the secondary shutter. The secondary shutter increases safety and the speed of operation. The secondary shutter is bolted onto the front of the source holder and operates on 220 VAC. 90 VDC. The secondary shutter pushes against a spring to open, so if power is lost the spring will automatically close the shutter.

4.2.2 Flashing Light on Source Enclosure. Indicates when both shutters are open

4.2.3 Microswitches and Shock Absorber at the ends of the Tracks. Prevent the trolleys from over-travel.

4.2.4 Emergency Stops. Are located at each end of tracks and on the operator's console. When any of them are engaged, the trolleys will stop and both source shutters will close.

4.2.5 Trolley Motion Beeper. The beeper will sound when the trolley is in motion.

4.2.6 Exclusion Zone. The exclusion zone denotes an area where access shall be controlled during operation. Figure 1 shows a typical exclusion zone. No one except workers with dosimeters will be allowed in this area when both shutters are opened.

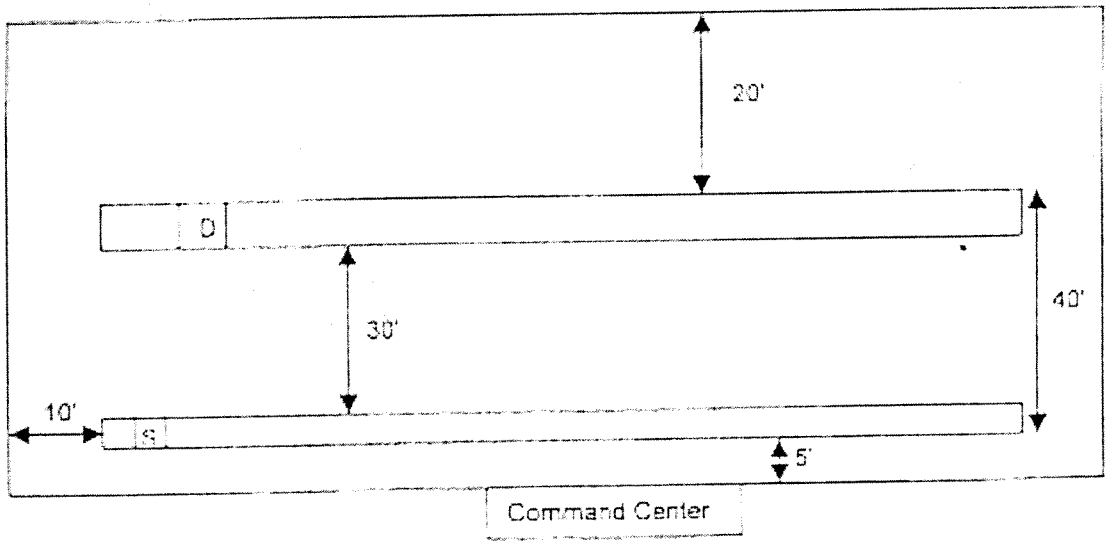

Figure 1. Exclusion Zone

5.0 RADIATION SURVEY METER. The operator must take daily readings using the Victoreen 450P, Radiation Survey Ion Chamber Instrument, which was supplied at the time of system delivery. The Victoreen will be calibrated once a year. NEEMR will provide a "loaner" Victoreen when the port's unit is away for calibration or repair. NEEMR will make the arrangements for Victoreen calibration or repair, and will fund it. The Victoreen must be allowed to warm-up prior to the readings being taken for about five minutes. The Victoreen is to be placed outside during warm-up so it can acclimate to the environment. The readings are to be taken flush against the front of the source enclosure even with the source height (Figure 2). The source enclosure and both shutters shall be closed during this time. Readings are to be taken first thing in the morning, after lunch, and at the end of the day. These readings must be recorded on the "DAILY GAMMA RADIATION LEVEL CHECK," Attachment 4. At the end of each month, a copy of the DAILY GAMMA RADIATION LEVEL CHECK sheet is to be faxed to the USCS Radiation Safety Officer, Dr. Siraj Khan at (202) 927-1418 at the end of each month.

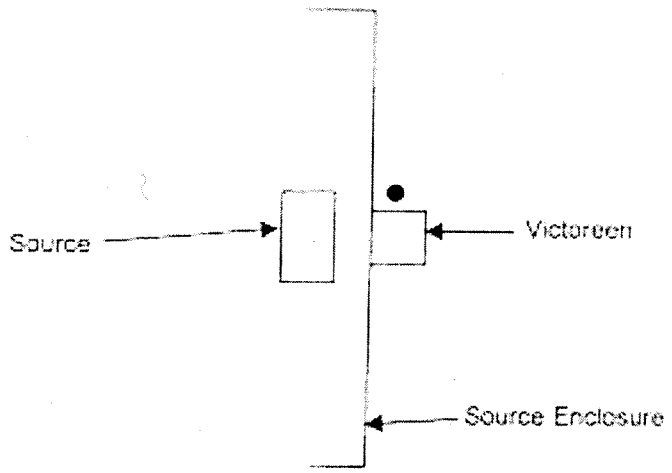

Figure 2. Daily Readings Placement

5.1 PERSONNEL EXPOSURE. If an individual has been inside the exclusion zone during a scan, this should be immediately reported to the local VACIS Coordinator who will contact the Radiation Safety Officer (RSO) for the USCS. The RSO will decide on the appropriate course of action.

6.0 SECURITY.

6.1 System Security. Whenever the system is left unattended, the system must be secured. This includes:

- Locating the system in a secure area.
- Placing barriers such a cones or chains across the entrance and exit.
- Placing the safety pin through the source housing and securing it with the combination lock.
- Locking the door to the source enclosure with the key. The set of operator keys shall be kept by the inspector in-charge with operating the VACIS.
- Locking the Command Center (RV or booth).

6.2 Image Security. All images are considered "Law Enforcement Sensitive," and must be marked accordingly. Security within the Command Center (RV or booth) must be enforced so no one outside the U.S. law enforcement community can view the images on the screen(s). These rules apply during general public tours and normal operation.

6.3 Unsecured Sites. At sites where there is no around-the-clock security (no roving patrols or no security cameras) the source must be removed at the end of the last shift. The source will then be placed in a secure place like the vault. A forklift should be used to remove the source. The source with the shutters weighs over 200 lbs.

7.0 RECOMMENDED OPERATING CREW. To operate the VACIS properly and safely, each member of the operating crew must know and professionally execute their respective responsibilities. The minimum recommended staffing for the VACIS is two operators; one console operator/image analyst and one observer/safety/spotter. The observer/safety/ spotter must be vigilant to keep sightseers and pedestrians away from the VACIS while scanning. At least one operator, primarily the image analyst must be certified. To be a certified operator, the operator must successfully complete the one-week formal operator training course, two-weeks of reinforcement training and receive a written certificate. Per the NRC license, the system shall be operated or under the direct supervision and in the physical presence of individuals that have attended a one-day radiation safety training. This person may be the VACIS Coordinator. The VACIS Coordinator is selected for this position.

The safety/spotter shall monitor and maintain positive control of the target vehicle driver at all times. If any member of the crew notices the system being operated in an "unsafe" condition, i.e. someone in the exclusion zone, they are to push an

emergency stop button immediately. There are several other responsibilities that must be accomplished by the operating crew:

- Performing pre-operational checks
- Conducting daily radiation surveys
- Maintaining system and personnel safety
- Operating the system safely
- Directing the vehicle into inspection position
- Maintaining control of vehicle operator during scan
- Directing all vehicle and pedestrian traffic
- Reporting "all clear" to the console operators
- Initiating the actual examination of the vehicle
- Ensuring that the exclusion zone remains clear during a scan
- Saving the image, including any remarks
- Ensuring legal procedures are followed
- Making the release or detain decision
- Completing operating logs
- Placing maintenance service calls
- Conducting file management, weekly

8.0 OPERATIONAL PROCEDURES. Below are the steps to use for operating the VACIS.

- PRE-OPERATION

  - Unlock Command Center.
  - Turn-on power to the Command Center (For the RV – press in the top half of both switches labeled "Battery Disconnect" at head level above the door to the Command Center).
  - Place Victoreen (450P, Radiation Survey Ion Chamber Instrument), outside and turn-on (allow a minimum of 5 minutes for warm-up) also perform a battery check.
  - Start generators – if using generator power.
    - For the RV – The utilities generator controls are up front on the dash (verify the amber ON lettering remains lit after the startup).
    - For the RV – The 220 Volt VACIS generator controls are located in the rear of the RV (verify that the amber light on the switch is lit).
  - Turn-on two ganged circuit breakers in gray electrical enclosure (up position).
  - Turn-on and adjust climate controls (heat or A/C).
  - Turn-on printer.
  - Turn-on Uninterruptible Power Supply (UPS) beside computer (use top button – wait for complete boot up).
  - Turn-on computer. The VACIS software should start automatically when the computer starts up. The software can also be started by

double clicking on the VACIS II icon located on the center of the desktop.

- Turn-on the Closed Circuit Television (CCTV) system.
- If equipped, turn-on other monitors (TV on channel 3 and TV 1 AUX button depressed).
- Turn-on SOURCE POWER (key lock) on the operator's console and depress the yellow RESET button on the operator's console.
- Listen for Source Trolley alarm. If alarm is on, check to ensure all E-stops are not engaged and that the Trolley is not against the bumper stop at either end of the track. If necessary, pull up E-stop buttons and manually position trolleys.
- Blow or brush the tracks clean with the leaf blower provided. Do NOT use the power washer from the Truck X-ray. It can damage the system.
- Remove the tie-down straps (if outside). Store the straps in the Command Center.
- Check Victoreen. Reading should be around 20 +/- 10 μR/hr (micro-Roentgen (10^{-6}) per hour) for natural background radiation. If the reading is outside of this range. Notify a local VACIS Coordinator.
- Take Victoreen reading flush against front of source enclosure on the trolley platform. Reading should be less than 0.65 mR/hr (milli-Roentgen (10^{-3}) per hour). If the reading is **more than 0.65 mR/hr,** notify a local VACIS Coordinator immediately. Record reading on the Victoreen Log, Attachment 4. Place the Victoreen in the Command Center.
- Open front of the source enclosure and remove the combination lock and retaining pin. Store padlock in support inside on the right and the retaining pin inside on the left of the enclosure. Close and lock the front cover.
- Open rear of the source enclosure and ensure that the AUTO/MANUAL switch is in AUTO. Close and lock the rear cover.
- Open the detector trolley enclosure and ensure that the AUTO/MANUAL switch is in AUTO. Close and lock the enclosure.
- Inside Command Center, start the VACIS program on the computer.
- Check that the operator console e-stop is not engaged.
- On the operator's console, verify that the Trolley Control is in the AUTO position. Press the RESET button. Then press the SHUTTER ENABLE and PRIMARY SHUTTER OPEN buttons.
- At the keyboard, select **Preferences,** then **System Setup**. At the prompt, select **Home Trolleys**. Wait until both trolleys are at their "home" position.
- After the trolleys move, check the Trolley Setup and Position screen. Verify the source angle is correct (typically 10°). If the source angle is not correct, set the correct angle and click **Set**. Verify and correct Source to Target Distance, Source to Detector Distance, Source Height and Travel Distance (typically 70 ft.). Make any changes

effective by clicking **Commit Moves**. Wait until changes are made, then press **OK** to close the window.

- With no vehicle or personnel in the scan area (check with the ground crew and insure that the scan area is clear and remains clear), align trolleys by selecting **Acquire** and then **Align Trolleys**. When the graphic of the detectors appears, scroll through it to verify that the detectors are working (detector outline is shown in gray). If any of the detector outlines is shown in a color other than gray, that detector is not working properly. Contact NEEMR for service if any of the detectors is not working. The system can be used but a black line will appear at that detector's position across the scan.
- Take down barriers/open doors.

- OPERATION

  - Selected vehicle is sent to the VACIS.
  - The safety/spotter directs the vehicle into the scan position utilizing the markings on the ground.
  - The driver is requested to turn-off the engine and get out of the vehicle.
  - The safety/spotter will escort the driver out of the exclusion zone and tell him/her to wait in the designated area.
  - When everyone is where he or she should be, the safety/spotter gives the ***"all clear"*** to the scan operator. The safety/spotter will continue to monitor the exclusion zone during the scan to ensure no one enters the zone.
  - The scan operator notifies the safety/spotter staff that he is ready to start a scan.
  - Then the scan operator starts the scan by selecting **Acquire** and then **Acquire!**.
  - When the scan is complete, the operator interprets the image.
  - Complete operating logs.
  - The scan operator saves the image making text, line and/or audio annotations as appropriate. It is strongly recommended that the operator use the default file name, i.e. YYYY.MM.DD_hh:mm:ss XXX. Where **YYYY** is the year, **MM** is the month, **DD** is the day, **hh** is the hour, **mm** is the minute, **ss** is the second, and **XXX** is the file extension.
  - The inspector makes the release/detain decision.
  - If the vehicle is sent to be devanned, a hard copy of the image should be sent to the devanning office. The area(s) in question should be highlighted in the hard copy.
  - The driver is escorted back to the vehicle and instructed if he/she is to drive the vehicle to be devanned or if the vehicle is released.
  - The safety/spotter guides the driver out of the inspection area.

- SHUT DOWN

  - Replace barriers/close door.
  - Take Victoreen (450P, Radiation Survey Ion Chamber Instrument), outside and turn-on (allow a minimum of 5 minutes for warm-up).
  - Select **Preferences**, **System Setup**.
  - If the angle was changed to other than 10°, select a source angle of 10°, then set the source height, and then click **Set**.
  - Select **Synchronize Trolleys**, then move trolley bar to tie-down position, and then click **Commit Moves**. Wait for trolleys to move to position. When trolleys have stopped select **OK**.
  - Exit the VACIS program (use Exit icon or File then Exit on the pull down menu).
  - Shut down the computer by clicking on **Start** (in lower left-hand corner of the screen). Select **Shut Down** then select **Shut Down the Computer?** And wait until the computer shut down procedure is complete.
  - Turn the computer off.
  - Turn-off the CCTV system, printer and monitors.
  - Turn-off UPS.
  - Press the PRIMARY SHUTTER CLOSE button and the SHUTTER DISABLE button on the operator's console. Check to see that both shutter indicator lights go off.
  - Turn-off SOURCE POWER (key lock).
  - Check Victoreen. Reading should be around 20 +/- 10 μR/hr for background radiation. If the reading is outside of this range, notify a local VACIS Coordinator.
  - Take Victoreen reading flush against front of source enclosure on the trolley platform even with the source height. Reading should be under 0.65 mR/hr. If the reading is **more than 0.65 mR/hr**, notify a local Radiation Coordination Officer. Record reading on the Victoreen Log, Attachment 4. Turn-off Victoreen.
  - Open front of source enclosure and secure source with the retaining pin and padlock. The source will need to be at 10° for the pin to be inserted.
  - Close and lock front of source enclosure.
  - Install tie-down straps on the detector trolley.
  - Return Victoreen to Command Center and turn-off.
  - Turn-off ganged computer circuit breakers in the gray electrical box (down position).
  - Turn-off climate controls (heat or A/C).
  - Close and lock all exterior windows to the Command Center.
  - Turn-off all lights.
  - Turn-off generators.

- Turn-off power to the Command Center (for the RV – press the lower half of both "Battery Disconnect" switches).
- Lock the Command Center.

9.0 OPERATIONAL CONSIDERATIONS. Proper care and cleaning of the VACIS will serve to maximize the number of hours the system is available to perform scans. The following simple concepts can enhance system effectiveness.

9.1 Scheduling of Services. Due to the location of the VACIS (proximity to the smuggler), it is not difficult to visually detect the operational condition of the system. It is recommended that all services that require the system to be shut down be scheduled in as random a manner as practicable such that a pattern of downtime is not predictable.

9.2 Sabotage. Experience has shown there is a high probability of vehicle driver inflicting sabotage to the equipment. Crew members should be alert to this possibility.

9.3 Certain Commodities. The VACIS is unable to penetrate certain dense commodities. However the VACIS is still able to penetrate the container itself. The VACIS can identify voids and false compartments typically associated with the transportation of contraband. The use of the VACIS in these instances will prevent needless drilling of suspected compartments.

9.4 Emergency Stop. Use of any of the emergency stop buttons will shut down the system and closes both shutters. The analyst will still be able to manipulate/enhance the part of the image that was obtained.

9.5 Vehicle Exit. For those installations that have the cables between the tracks in cable covers (not in conduits under the surface), the safety/spotter will need to watch that the driver does not drag the cables with him when he exits. Also, the personnel will need to make sure that the driver does not lower the support legs of the trailer onto the cable covers.

9.6 Placement of the Vehicle to be Scanned. The vehicle being scanned should be parked parallel to tracks, with the closest side approximately 4 feet from the inside of the detector track. Lines should have been painted on the ground surface at the time of installation to indicate the optimum position.

10.0 EMERGENCY PROCEDURES.

10.1 Severe Weather.

10.1.1 Hurricanes. If the VACIS is located outside, the source and source holder should be removed from the enclosure when a hurricane is anticipated to strike the immediate area. A local VACIS Coordinator must be contacted before the source is moved. The VACIS Coordinator will in turn notify NEEMR and the RSO. The source should be transported to a secure area that is expected to withstand the hurricane, i.e. the vault. The source shall only be removed under the direct supervision of the local VACIS Coordinator. The source is heavy so a forklift is necessary to remove and transport it.

10.1.2 High Winds. Those systems that are outside will be equipped with detector tower tie-downs at the time of installation. When the wind is over 40 mph, the detector tower should be tied-down. If winds in excess of 80 mph are anticipated, contact NEEMR 24 hours in advance. NEEMR will arrange for a qualified maintenance technician to come and disassemble the detector tower.

10.2 Collision with the Source Enclosure. If the source enclosure is struck either by a truck or other vehicle the following steps should be followed:

- Shut the system down by using any of the emergency stop buttons.
- Remove all non-essential personnel from the immediate area.
- Take radiation readings utilizing the Victoreen 450P in front of the enclosure even with the source height.
  - If the readings **do not exceed 0.65 mR/hr**, the system is safe. If the system has suffered any damage, call NEEMR and request service. Notify a local VACIS Coordinator and report the incident. If the system is not operational follow normal shut down procedures.
  - If the readings **do exceed 0.65 mR/hr** precautions must be taken. All personnel shall back away from the source until the reading is at or below 0.65 mR/hr. At this point, a secure perimeter should be established surrounding the source. No one shall be allowed inside this perimeter until responding officials arrive. Notify a local VACIS Coordinator immediately of the situation. He/she shall notify the USCS RSO, Dr. Siraj Khan for further instructions. The port and local Customs officials shall also be notified of the situation.

10.3 Secondary Shutter Fails to Close. If the operator determines that the secondary shutter is not closing properly or is stuck open, the operator shall perform the following steps:

- Shut the system down by using any of the emergency stop buttons.
- Remove all non-essential personnel from the immediate area.
- Take radiation readings utilizing the Victoreen 450P. All personnel should back away from the source until the reading is at or below 0.65 mR/hr at this point a secure perimeter shall be established surrounding the source. No one should be allowed inside this perimeter until responding officials arrive. A local VACIS Coordinator should be notified immediately of the situation. He/she shall notify the USCS RSO, Dr. Khan. The port and local Customs officials should also be notified of the situation.

11.0 CARE AND CLEANING. As with any type of equipment, proper operation is assured by following good housekeeping and failure prevention techniques. While the National Enforcement Equipment Maintenance and Repair (NEEMR) Program will accomplish all scheduled and corrective maintenance, normal care and cleaning and some minor checks are the responsibility of the VACIS operating personnel. These tasks are listed in the SAIC Operator's Manual. It should be noted that these tasks do not involve actual maintenance, instead they are merely checks and cleaning requirements. If any deficiencies are found during these operations call NEEMR at 703-492-4242 to request service.

11.1 PRE-OPERATIONAL CHECKS. Pre-operational tasks are found in the Operator's Manual at paragraph 2.7. As these tasks are accomplished, Attachment 1, "PRE-OPERATIONAL CHECKS" should be completed by the operator.

11.2 COMMAND CENTER CARE. This entails normal upkeep of the Command Center (CC) delivered with the system (RV or booth). CC care is a responsibility of the port. CC care directly related to the VACIS includes the following categories of equipment/services.

11.2.1 Generator Care. The oil and filter on the generator(s) needs to be changed periodically. Refer to the owner's manuals that were delivered with the system for specifics. Servicing of the generators should only be performed by a licensed maintenance facility in order not to void the warranty. Call NEEMR to arrange for service and payment for service.

11.2.2 Electricity. Check the cables periodically connecting the CC with the power supply and ensure that they are not frayed and are securely connected.

11.2.3 Lighting. Ensure that the lights (inside and outside) are in good working order. The supply and changing of light bulbs in the Command Center is the responsibility of the port.

11.2.4 Cleaning and Refuse Removal. Janitorial services of the CC are the responsibility of the port. Use of the stove, refrigerator, toilet, TV, etc. will require periodic cleaning and servicing. For the proper care of these items, refer to the RV manuals provided with the system.

11.2.5 Fuel. Supplying the RV with fuel is a responsibility of the port. It is recommended that if operating on generator power, daily fuel level readings should be taken. The ignition must be powered to take these readings. The generators will not run if there is 10 gallons or less in the fuel tank. This 10 gallons will allow the RV to be driven to a nearby gas station for refueling.

11.2.6 RV Maintenance. Call NEEMR to arrange for service to the RV and payment for these services.

11.2.7 Supplies. An initial supply of paper, printer-ink and writable CDs are supplied with the system. Replenishment of these items is the responsibility of the port.

11.2.8 RV Heat. The heaters are fueled by propane. The RV is delivered with an empty propane tank. If the port wishes to use the heater, they will need to get the tank filled by a licensed dealer. To operate the heaters the LP detector switch must be "ON." The LP detector switch is either mounted under the sink or above the stove (depending on which model the Port has).

12.0 COMPUTER HOUSEKEEPING. On a weekly basis, or sooner if conditions warrant, it is recommended that the scan files be backed-up on to CDs. The procedure below should be followed for the CD Maker program to ensure this is being done properly.

- Go to the Windows NT Desktop Screen by either closing the VACIS II program or minimizing it.
- On the Windows NT Desktop Screen, double-click on **CD MAKER** icon.
- Select **CD-ROM** option from the NTI CD Maker Pro dialog box by clicking on it once. (This will make a data CD).
- Move the mouse arrow to the **Import Files** icon (5th icon just below the pull down menu items) and click once on the icon.
- Select **Browse** from the **Import Files** dialog box. (You are now in the browse folder screen).
- Browse for the Folder then, select "+" next to MY COMPUTER.
- Select drive location by highlighting "D" and clicking on it once.

- Select **OK**.
- "**D**" should now appear in the LOOK IN line.
- Click once on the **first item** listed.
- Hold down the **Shift** key and then press the **down arrow** key until all items are highlighted.
- Move mouse to **Add** box and click once.
- When all of the items you want transferred to CD have been added, click once on the **DONE** box.
- On the NTI-CD MAKER PRO Screen, all of the selected items should be listed on the screen.
- Select the **Write** icon (14th icon across the top just below the pull down menu) by clicking once.
- The WRITE Disk Screen will appear.
- Insert the CD you want to copy to in the CD Recorder located on the Computer Case. With the CD in the CD Recorder, click on the **Write** box.
- This process may take as long as 15 – 20 minutes to write a full CD.
- When the process is finished, it will prompt you that the process is completed. Remove the CD from the CD Recorder and label it WITH A FELT TIP PEN. Remember do NOT touch the underneath side of the CD.
- File the CD.

After the operator has verified that the files have been transferred correctly and the new files are uncorrupted, the old files should be deleted from the hard drive using the following procedure.

- Move the mouse to the **Start** icon in bottom left corner of the screen.
- Click once with the RIGHT mouse button.
- Select **Explore** by clicking on it once.
- Slide the scroll bar down until the **D** drive is selected. Click once.
- In the Contents window, select the files you wish to DELETE by clicking on the first one, then after it is highlighted hold down the **Shift** key and depress the **Arrow Down** key to highlight the files you wish to delete.
- After the files have been selected and highlighted depress the "**Delete**" key.
- A Confirm Multiple File Delete Screen will appear. Select **Yes** if you wish to delete all the files highlighted. Select **No** if you don't wish to delete all the highlighted files and return to the 5th step above.
- The selected files have been deleted and have been moved to the Recycle Bin.
- Close **Explore**.
- On the Windows NT Desktop, choose the **Recycle Bin** icon.
- Select the **File** menu.
- Select **Empty Recycle Bin** by clicking once.
- It will ask if you want these items deleted. Click on **Yes**.
- Close **Recycle Bin**.

13.0 MAINTENANCE AND REPAIR SUPPORT. In addition to the general housekeeping and equipment checks discussed above, there are also maintenance services that are outside the scope of normal operator duties. Corrective maintenance (repairs) as well as periodic (scheduled) maintenance comprise these services. They are provided by the National Enforcement Equipment Maintenance and Repair (NEEMR) Program, Woodbridge, VA, 703-492-4242.

13.1 Scheduled and Preventive Maintenance. NEEMR will arrange for scheduled and preventive maintenance. NEEMR will schedule the maintenance with the port so as to impact regular operations as little as possible. Preventive maintenance services are to be performed quarterly (once every 3 months).

13.2 Unscheduled Maintenance Actions. From time to time, indications observed during normal checks and during operations will identify that corrective action or repair is required. Prior to requesting support through the NEEMR Service Center, the coordinator should attempt to clear the anomaly following the guidelines contained in Attachment 2, "TROUBLESHOOTING." If the anomaly persists the VACIS Coordinator should initiate a request for NEEMR support.

14.0 KEYS. Several sets of keys are provided with each VACIS. There are two sets of RV or booth keys. For the RV, each set of keys consists of one key for the deadbolt on the main door, one key for the latch on the main door, one key for the ignition, one key for the exterior storage compartments and one key for the engine compartment. One set of these keys is the operator's set. The operator assigned to duty at the system will use these keys. The other set will be left with whomever the port director designates to keep just in case something happens to the operator's set. There are no other copies of these keys. It is the port's responsibility to keep track of them.

The detector modules and the source enclosure are also locked. All of the systems during the production will be keyed the same. Several copies of this key exist. One copy is on the operator set of RV or booth keys. The operator will need this key several times a day to remove/replace the primary shutter safety pin. One copy will be left to whomever the port director designates. SAIC and NTMI have copies so they can perform maintenance on the system. One copy was given to NEEMR and is kept at Woodbridge, VA

There is a combination lock that secures the safety pin for the primary shutter. All the combination locks will have the same combination. Operators are informed of this combination during operator training. It is also recommended

that the port writes down the combination and keep it with the source key in the safe.

15.0 OPERATIONAL DATA COLLECTION. In an effort to insure that the VACIS is maintained in the highest state of readiness practical, collecting operating history is necessary. At attachment 3, is an "OPERATIONS LOG" in which the operator records all corrective maintenance actions. This log is a chronological history of the systems operations and is submitted to the NEEMR Coordinator, Ellen Best (fax: 202-927-1418, phone: 202-927-2026) at the end of each week.

16.0 RECORD OF INSPECTIONS. The port must maintain a record of the inspections performed. Attachments 5, "VACIS LAND EXAMINATION" and 6, "VACIS SEA CONTAINER EXAMINATION" are copies of the information that must be completed for every inspection.

17.0 OPERATIONS LESSONS LEARNED. As a means of relating operational incidents and techniques used by VACIS crews, it is requested that such information be annotated on the "OPERATIONS LOG" form, Attachment 3. Information and/or suggestions will be reviewed by the NEEMR Team and distributed to all VACIS users as appropriate. The intent of this information is to enhance the operational effectiveness of the VACIS.

ATTACHMENT 1

PRE-OPERATIONAL CHECKS

DAILY LOG

Month/Year: _____/_____

Day	Clean Tracks	Initials	Check Warning Signs	Initials	Verify Source Indicator Light	Initials	Inspect Tower Tie-Downs	Initials
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
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31								

ATTACHMENT 1

PRE-OPERATIONAL CHECKS

WEEKLY LOG

Start Date: _____/_____ **End Date:** _____/_____

Week	Check Tracks	Initials	Clean IGUS Chain	Initials	Test E-Stops	Initials	Inspect Wheels & Cables	Initials
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
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ATTACHMENT 2

TROUBLESHOOTING

As with any complex system, problems will occur. Some of these random problems can be overcome by trying some simple troubleshooting procedures. A list of some commonly encountered problems along with suggested solutions is provided below.

ANOMALY	SOLUTION
Safety pin for the radiation source does not insert because the holes are not aligned.	Adjust the scan angle to 10° by using the buttons on the back of the source enclosure until the pin can be inserted easily.
System will not operate. If the system has been left idle for an extended length of time, it may not process commands properly.	Make sure the cables are connected securely. If the system still fails to respond, exit the program and re-start the VACIS software.
Black lines appear across the image.	Shut down the system and restart the system. If this does not correct the problem, go the **Acquire** menu and press **Normalize**. When the chart appears of the detectors, scroll through the screen. Look and see if any of the detectors are circled in white or black, if so there are probably bad detectors. Call NEEMR and request service.
No image on screen	Select **Normalize!** from the **Acquire** menu and check detector output levels. Gray detectors indicate normal output. Black or white detectors indicate no or low output. If the output is missing or low: 1. Select **Align Trolleys** from the **Acquire** menu. Recheck **Normalize!** output. 2. Select **Read All Boards** from the **Acquire** menu. For electronic

	boxes that are working normally, a reading for each electronic box in the system will appear, followed by a line of five-digit reading for the detectors. Examine the output for the electronic boxes. A count of 37 is typical for normally functioning electronic boxes. Values shown in black indicate normal ranges for the detectors. Red indicates no source counts. Blue indicates possible high counts. Fuchsia indicates possible low counts. An "a8" checksum bit should be at the end of the display. High or low counts can indicate that the distances entered in Trolley Setup and Position are incorrect. Enter correct value and recheck detectors. 3. Other sources of radiation may be affecting the count readings. Make sure no other sources are present in the object being scanned or in the areas near the system. 4. Cycle the AC power at the detector tower. 5. Make sure the retaining pin that prevents the source from rotating is removed. 6. Make sure both shutters are functioning by pressing the console buttons enabling the shutters. 7. Check cabling and connections to the source enclosure motor.
Edges of the image appear excessively jagged	The distance values for the source-to-target and source-to-detector entered in **Preferences** then **System Setup** then **Trolley Setup and Position** may be incorrect. The distance from the center of the source track to the center of the vehicle should be measured. Adjust the distance

	values and rescan the image.
Image does not show expected areas of scanned vehicle	1. Check the settings for source angle in the **Trolley Setup and Position** dialog box. If scan angle is set (other than 0), the detector and source trolleys will not be parallel, and the image will be different from a straight scan. 2. Check the height of the source in the source enclosure to make sure that the beam of the source is not aimed too high or too low for the desired image.
Image quality is degraded	From the **Acquire** menu press **Normalize!**. The normalization counts are used to compensate for variations in the individual detectors counting ability, which changes due to a number of factors, particularly temperature and environmental operating conditions.

ATTACHMENT 3

OPERATIONS LOG

UNITED STATES CUSTOMS SERVICE
APPLIED TECHNOLOGY DIVISION
NATIONAL ENFORCEMENT EQUIPMENT MAINTENANCE AND REPAIR PROGRAM

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1) The VACIS Operations Log is for NEEMR use. It is separate from OFO usage statistics. This information is very important for our maintenance and engineering support role.

2) SPECIFIC INSTRUCTIONS. Below are specific instructions for each item on the form.

   a) Schedule Hours. These are the hours when someone is actually on duty at the VACIS.

   b) Date. This is the calendar date. This is written as month/day/year. For example May 15, 1999 is written as 5/15/99.

   c) Time Up. This is the clock time when the system is ready to perform a scan. It is the time after the VACIS has been Normalized!.

   d) Time Down. This is clock time when the system is not operational due to a system problem. This includes item like taking the system down because of poor scan quality, no signal, broken IGUS chain, detector problems, broken wheels, etc. The down time incidents and corresponding data needs to be recorded for all down time experienced.

   e) Non System Down Time. This is anytime the VACIS is not active but is available. This would include times when there are no containers or vehicles to scan, power outages, training, tours, etc. The down time data needs to be recorded for all down time experienced.

   f) Describe "Incident" VACIS System. This is an explanation of Time Down. It includes items such as what happened, what was going on at the time of the incident, how did it happen, etc.

g) Corrective Action Taken. This is what action(s) the operator performed to try to get the system operational. It includes such items as powering the system down, re-normalizing, checking the cables, etc.

h) Scan Count. The Scan count is obtained by choosing ***Acquire!*** from the Main Menu bar. From the ***Acquire!*** menu choose ***Acquisition Count***. The Acquisition Dialog Box appears. Enter the value found in the **Total Cumulative Acquisitions**.

i) Contact NEEMR. This is space to indicate if NEEMR has been contacted to provide maintenance to correct an "incident". A simple Yes (Y) or No (N) is all that is needed.

j) Operator Initials. These are the initials of the operator filling out the form.

3) Several lines on the form can be used for each day. Take what space is necessary to fully provide the information requested.

4) Always call the NEEMR Help Desk Hot Line (703) 492-4242 to report any system problems.

5) Please fax a copy of the operation log each week to Ellen Best at (202) 927-2002 or (202) 927-1418. If there are any questions regarding filling out the form, phone Ellen at (202) 927-2026. Thank you for your assistance in collecting this data. This data is essential for planning and performing future maintenance actions.

At the end of each week fax this form to Ellen Best at (202) 927 – 2002/1418.

Operations Log

Scheduled	M	Tu	W	Th	F	Sat	Sun
Hour Open							
Hour Close							

Site _____

Operational Status

Date	Time Up	Time Down	Non System Down-Time	Describe "Incident" VACIS System	Corrective Action Taken	Scan Count	Contact NEEMR	Operator's Initials

ATTACHMENT 4

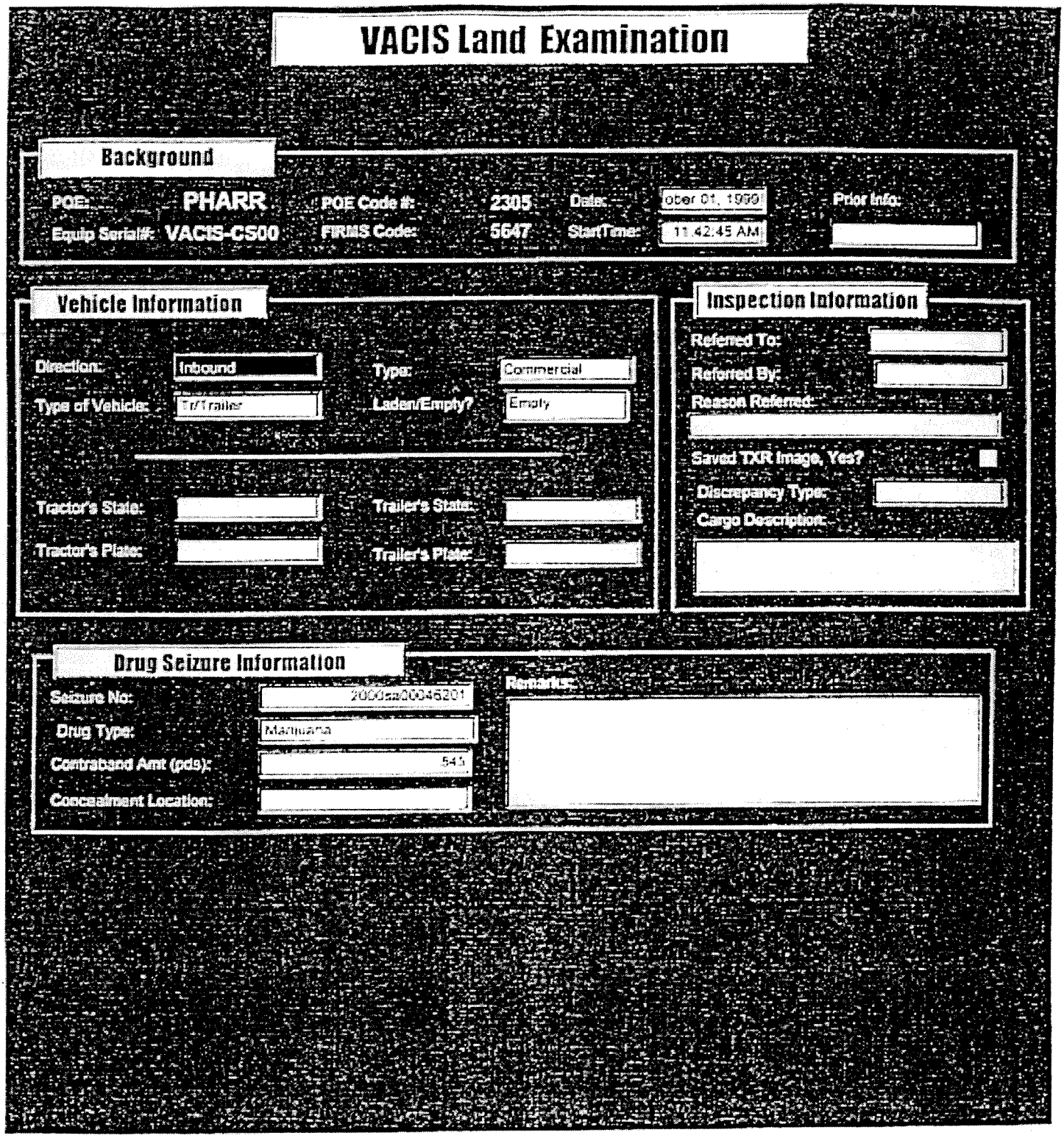
DAILY GAMMA RADIATION LEVEL CHECK

To be performed by a trained operator before operations in the morning, once randomly during the day, and when the primary shutter is locked when operations cease. All readings will be taken flush against the front of the source enclosure, even with the source height. All readings in mR/hr. Each month fax this form to Dr. Siraj Khan at (202) 927 – 1418.

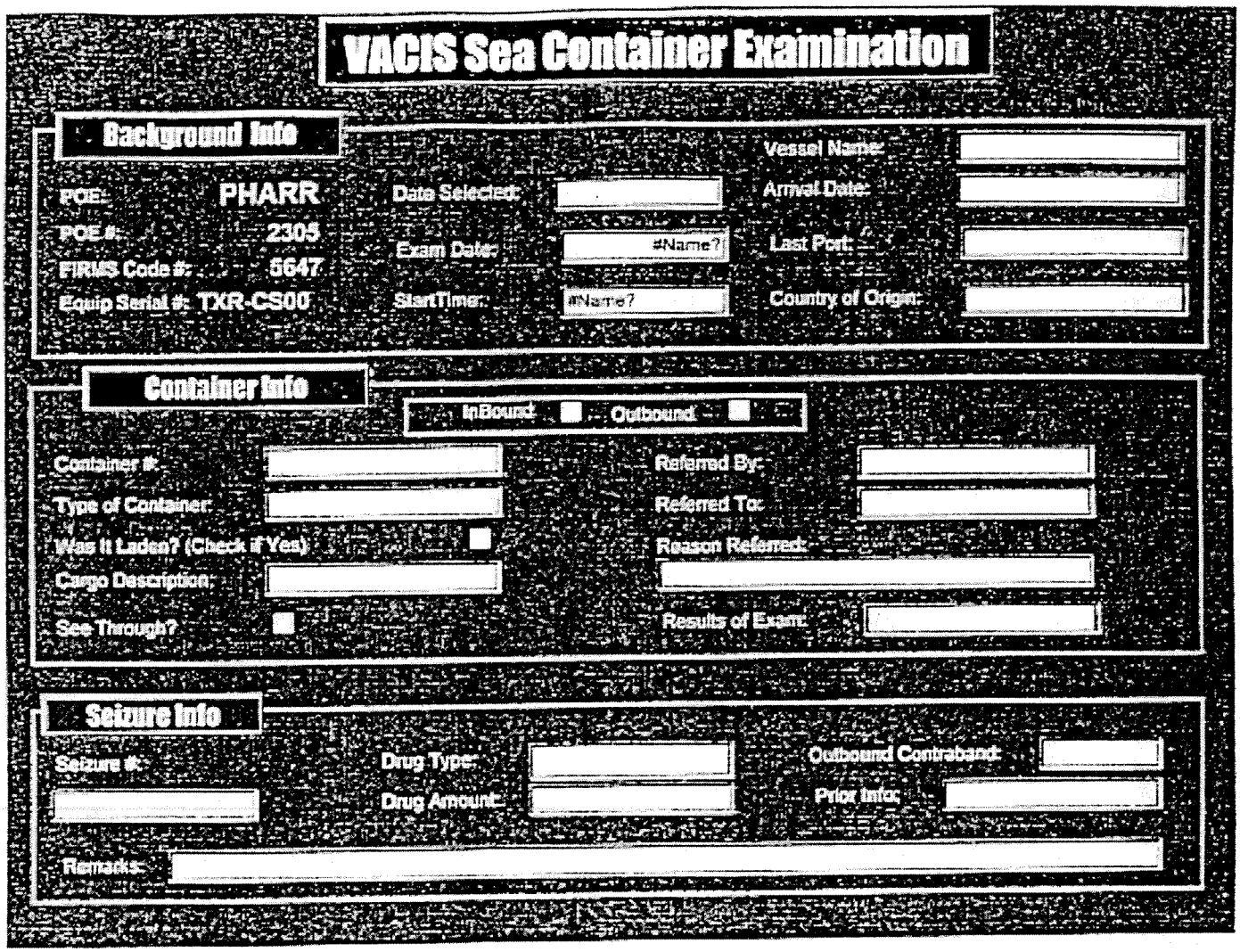
Site _____, Victoreen 450, SN _____

Date	Time and reading of morning check	Time and reading of random check	Time and reading of shutdown check

ATTACHMENT 5



ATTACHMENT 6



APPENDIX D

NRC Materials License for ^{137}Cs sealed sources (License number 08-17447-01, Amendment 15)

NRC FORM 374 U.S. NUCLEAR REGULATORY COMMISSION PAGE 1 OF 7 PAGES

Amendment No. 15

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CORRECTED COPY MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	In accordance with the facsimile dated January 5, 2001
1. Department of the Treasury U.S. Customs Service	3. License number 08-17447-01 is amended in its entirety to read as follows:
2. 1300 Pennsylvania Avenue, N.W. Room 2.2.C Washington, D.C. 20229	4. Expiration date August 31, 2003
	5. Docket No. 030-12771 Reference No.

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Cobalt 60	A. Sealed sources (Amersham Model No. CDC.PT, Ohmart Model No. 2100)	A. No single source to exceed the maximum activity specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State
B. Barium 133	B. Sealed sources (Amersham Model No. BDC-700, Dupont Model No. NER-474, IPL Model Nos. HEG-133 - formerly 225 and PHI-133-GFS series)	B. No single source to exceed the maximum activity specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State
C. Cesium 137	C. Sealed Sources (Amersham Model No. CDC.700, Ohmart Model No. 2102)	C. No single source to exceed the maximum activity specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State

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MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number
[illegible]-17447-01
Docket or Reference Number
030-12771

Amendment No. 15
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6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
D. Cesium 137	D. Sealed sources (3M Model No. 4F6S, Monsanto Research Corp. Model 24148, Amersham Corp. Models CDC.700 and CDC.711m, Ohmart Model No. A-2102)	D. No single source to exceed the maximum activity specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State
E. Cobalt 60	E. Sealed Sources (Amersham Model CKC-P1, U.S. Nuclear Model 3280, Monsanto Research Corporation Model 24148, Minnesota Mining and Manufacturing Co. Model [illegible] or Ohmart Model No. A-	E. No single source to exceed the maximum activity specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State

9. Authorized use:

A. and C. To be used for the detection of narcotics in vehicle gauging devices that have been registered either with the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or with an Agreement State and have been distributed in accordance with a Commission or Agreement State specific license authorizing distribution to persons specifically authorized by a Commission or Agreement State license to receive, possess, and use the devices.

B. For measuring physical properties of materials, in a Campbell Security Equipment Company Model K, portable gauging device.

D. For use in Ohmart Models SH-F2, and SH-F3 gauging devices included in Science Applications International, Inc. (SAIC) Model Mobile VACIS, and VACIS II devices for the detection of contraband, and for use in Ohmart Model SH-F2 prototype Pallet VACIS device for the detection of contraband.

E. For use in Ohmart Model SHLG-3 prototype Pallet VACIS device for detection of contraband.

CONDITIONS

10. A. Licensed material in Item 6.A. may be used at the licensee's facilities located at Ports of Entry, Seaports (Customs Cargo Enforcement Team Facilities), and at temporary job sites of the licensee anywhere in the United States.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

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Amendment No. 15
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B. Licensed material in Items 6.B. may be used at the licensee's facilities at 1300 Pennsylvania Avenue, N.W., Washington, D.C., and at temporary job sites of the licensee anywhere in the United States.

C. Licensed material in Item 6.C. may be used at the licensee's facilities located at Border Railroad Crossings.

D. Licensed material in Item 6.D. may be used at the licensee's facilities located at Ports of Entry, Seaports (Customs Cargo Enforcement Team Facilities), and at temporary job sites of the licensee anywhere in the United States. In addition, prototype testing as specified in Item 9.D. may only be performed at Fort Huachuca, Sierra Vista, Arizona.

E. Licensed material in Item 6.E may only be used at the licensee's facilities located at Fort Huachuca, Sierra Vista, Arizona.

11. A. Licensed material in Items 6.A. and 6.C., shall be used by, or under the supervision of individuals who have received the training described in the letter dated March 30, 2000 and have been designated, in writing, by the Radiation Safety Officer. The licensee shall maintain records of individuals designated as users for 3 years following the last use of licensed material by the individual.

B. Licensed material in Items 6.B. shall be used by, or under the supervision and in the physical presence of individuals who have received the training described in application dated April 26, 1993 and have been approved in writing by the Radiation Safety Officer. The licensee shall maintain records of individuals designated as users for 3 years following the last use of licensed material by the individual.

C. Licensed material in Items 6.D. and 6.E shall be used by, or under the supervision of individuals who have received the training described in letters dated March 31, 1998 and March 30, 2000 and have been approved in writing by the Radiation Safety Officer. The licensee shall maintain records of individuals designated as users for 3 years following the last use of licensed material by the individual.

12. The Radiation Safety Officer for this license is Richard T. Whitman.

13. In addition to the possession limits in Item 8, the licensee shall further restrict the possession of licensed material so that at no time is a quantity of radioactive material possessed in excess of a quantity which requires decommissioning funding in accordance with 10 CFR 30.35(d), 10 CFR 40.36(b), or 10 CFR 70.25(d).

14. This license does not authorize commercial distribution of licensed material.

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MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number
[illegible]-17447-01
Docket or Reference Number
030-12771

Amendment No. 15
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15. A. Sealed sources and detector cells containing licensed material shall be tested for leakage and/or contamination at intervals not to exceed six months or at such other intervals as are specified by the certificate of registration referred to in 10 CFR 32.210, not to exceed three years.

B. Notwithstanding Paragraph A of this Condition, sealed sources designed to emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed three months.

C. In the absence of a certificate from a transferor indicating that a leak test has been made within six months prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.

D. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to any use or transfer as a sealed source.

E. Sealed sources and detector cells need not be leak tested if:

(i) they contain only hydrogen-3 or

(ii) they contain only a radioactive gas; or

(iii) the half-life of the isotope is 30 days or less; or

(iv) they contain not more than 100 microcuries of beta and/or gamma emitting material or not more than 10 microcuries of alpha emitting material; or

(v) they are not designed to emit alpha particles, are in storage, and are not being used. However, when they are removed from storage for use or transfer to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source or detector cell shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.

F. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. If the test reveals the presence of 0.005 microcurie or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission and the source or detector cell shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within five days of the date the leak test result is known with the appropriate U.S. Nuclear Regulatory Commission, Regional Office referenced in Appendix D of 10 CFR Part 20. The report shall specify the source or detector cell involved, the test results, and corrective action taken.

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G. The licensee is authorized to collect leak test samples for analysis by SAIC, Inc. Alternatively, tests for leakage and/or contamination may be performed by persons specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

16. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders or detector cells by the licensee.

17. The licensee shall conduct a physical inventory every six months to account for all sealed sources and devices containing licensed material received and possessed under the license.

18. Each portable nuclear gauge shall have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. The gauge or its container must be locked when in transport, storage or when not under the direct surveillance of an authorized user.

19. Any cleaning, maintenance, or repair of the gauges that requires detaching the source or source rod from the gauge shall be performed only by the manufacturer or other persons specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

20. A. If the licensee uses unshielded sealed sources extended more than 3 feet below the surface, the licensee shall use surface casing that extends from the lowest depth to 12 inches above the surface and other appropriate procedures to reduce the probability of the source or probe becoming lodged below the surface. If it is not possible to extend the casing to 12 inches above the surface, the licensee shall implement procedures to ensure that the sealed source is free of obstruction before making measurements.

B. If a sealed source or a probe containing sealed sources becomes lodged below the surface and it becomes apparent that efforts to recover the sealed source or probe may not be successful, the licensee shall notify the U.S. Nuclear Regulatory Commission and submit the report required by 10 CFR 30.50(b)(2) and (c). The licensee shall not abandon the sealed source or probe without obtaining the Commission's prior written consent.

21. A. Each gauge shall be tested for the proper operation of the on-off mechanism (shutter) and indicator, if any, at intervals not to exceed 6 months or at such longer intervals as specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission pursuant to 10 CFR 32.210 or the equivalent regulations of an Agreement State.

B. Notwithstanding the periodic on-off mechanism (shutter) and indicator test, the requirement does not apply to gauges that are stored, not being used, and have the shutter lock mechanism in a locked position. The gauges exempted from this periodic test shall be tested before use.

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22. The following services shall not be performed by the licensee: installation, initial radiation surveys, relocation, removal from service, dismantling, alignment, replacement, disposal of the sealed source and non-routine maintenance or repair of components related to the radiological safety of the gauge (i.e., the sealed source, the source holder, source drive mechanism, on-off mechanism (shutter), shutter control, shielding). These services shall be performed only by persons specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

23. The licensee may initially mount a gauge if permitted by the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State and under the following conditions:

    A. The gauge must be mounted in accordance with written instructions provided by the manufacturer;

    B. The gauge must be mounted in a location compatible with the "Conditions of Normal Use" and "Limitations and/or Other Conditions of Use" in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State;

    C. The on-off mechanism (shutter) must be locked in the off position, if applicable, or the source must be otherwise fully shielded;

    D. The gauge must be received in good condition (i.e., package was not damaged); and

    E. The gauge must not require any modification within the proposed location.

    Mounting does not include electrical connection, activation or operation of the gauge. The source must remain fully shielded and the gauge may not be used until it is installed and made operational by a person specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such operations.

24. A. The licensee may maintain, repair, or replace device components that are not related to the radiological safety of the device containing byproduct material and that do not result in the potential for any portion of the body to come into contact with the primary beam or in increased radiation levels in accessible areas.

    B. The licensee may not maintain, repair, or replace any of the following device components: the sealed source, the source holder, source drive mechanism, on-off mechanism (shutter), shutter control, or shielding, or any other component related to the radiological safety of the device, except as provided otherwise by specific condition of this license.

25. Prior to initial use and after installation, relocation, dismantling, alignment, or any other activity involving the source or removal of the shielding, the licensee shall assure that a radiological survey is performed to determine radiation levels in accessible areas around, above and below the gauge with the shutter open. This survey shall be performed only by persons authorized to perform such services by the U.S. Nuclear Regulatory Commission or an Agreement State.

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26. The licensee shall operate each device containing licensed material within the manufacturer's specified temperature and environmental limits such that the shielding and shutter mechanism of the source holder are not compromised.

27. The licensee shall assure that the shutter mechanism of each device is locked in the closed position during periods when a portion of an individual's body may be subject to the direct radiation beam. The licensee shall review and modify as appropriate its "lock-out" procedures whenever a new device is obtained to incorporate the device manufacturer's recommendations.

28. The licensee is authorized to transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

29. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated April 26, 1993
B. Letter dated July 6, 1993
C. Letter dated December 6, 1993
D. Letter dated February 23, 1995
E. Letter dated March 31, 1998
F. Letter dated March 30, 2000
G. Letter dated September 9, 2000
H. Fascimile dated January 5, 2001
I. Letter received February 6, 2001
J. Fascimile dated February 16, 2001

For the U.S. Nuclear Regulatory Commission

Date February 26, 2001

By ***Original signed by Pamela J. Henderson***

Pamela J. Henderson
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety
Region I
King of Prussia, Pennsylvania 19406